# The Total Quality Management : The Knowledge, Adoption and Implementation of Contractors in Semarang

**THESIS**

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By
AIUOB MOHAMED SALEH ALI MATOUG
NLM: L4A909008

**POST GRADUATE**
**DIPONEGORO UNIVERSITY**
**SEMARANG, INDONESIA**
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Prepared by

AIUOB MOHAMED SALEH ALI MATOUG

NLM: L4A909008z

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Examiners

1. Jati Utomo D. H, ST, MM, M. Sc, PhD (Supervisor) .....
2. Ir. M. Agung W, MM, M. Sc PhD (Co supervisor) .....
3. Ir. Windu Partono, M. Sc, PhD (Examiner 1) .....
4. Ir. Bambang Pudjianto, MT (Examiner 2) .....

Semarang, 20 April 2011

Diponegoro University

Post Graduate program

Master of Civil Engenieering

Head program

Dr. Ir. Bambang Riyanto, DE.A

NIP. 19530326 198703. 1. 001

## STATEMENT OF AUTHENTIFICATION

Herewith I stated that this thesis has never been published in other institution and there were no part of this has been directly copied from published sources except citing from listed bibliographies attacthed.

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AIUOB MOHAMED SALEH ALI MATOUG

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## ABSTRACT

Total quality management (TQM) is one of the key approaches for continuous quality improvement of the products and services to meet customer satisfaction. By implementing the TQM the contractors can increase profits and productivity in their organization. The contractors in Semarang city are facing several problems to continue improving the quality, reducing costs and waste and increasing productivity.

The objectives of the study are to investigate the contractors' knowledge of TQM and the adoption and implementation of TQM in the construction industry in Semarang. This research applied qualitative and quantitative method. A questionnaire was sent to six contractors in Semarang. The response rate for the questionnaire was 93%.

The contractor with the highest level of knowledge in TQM was Adhi Karya, with 94% of its managerial/supervisor staff has undergone quality improvement training. On the TQM adoption and implementation, 11% of the respondents said that their company used TQM program to improve quality. The majority of respondents (79%) felt that the quality of their products and services had improved after implementing quality improvement program, with 89% of them also felt that their relationship with customers and suppliers had also improved after implementing such program. The majority of respondents (54%) also said that changing behavior and attitude of the people in organization was the biggest obstacle in implementating TQM. The study recommends that the contractors increase the adoption and implementation of TQM to meet future challenges in realizing the vision of world-class organization.



**Keywords:** TQM implementation, productivity, profits, contractor, Semarang

## ABSTRAK

Total quality management (TQM) adalah salah satu aplikasi kunci bagi peningkatan kualitas produk dan jasa layanan yang berkesinambungan untuk memuaskan pelanggan. Dengan mengimplementasikan TQM dalam organisasinya kontraktor bisa meningkatkan produktifitas dan laba. Kontraktor di Semarang saat ini sedang mengalami beberapa masalah dalam meningkatkan kualitas, memangkas biaya dan pemborosan dan meningkatkan produktifitas.

Tujuan dari riset ini adalah untuk mempelajari pengetahuan kontraktor tentang TQM dan mengkaji adopsi dan implementasi TQM di perusahaan jasa konstruksi di Semarang. Dengan demikian pertanyaan-pertanyaan yang diajukan dalam riset ini mengacu pada dua hal tersebut. Riset ini mengaplikasi metode kualitatif dan kuantitatif. Kuesioner dikirimkan ke responden di enam perusahaan konstruksi, dengan tingkat pengembalian sebesar 93%.

Kontraktor dengan pengetahuan tentang TQM tertinggi adalah Adhi Karya, dimana 94% staf manajemen telah mendapatkan pelatihan peningkatan kualitas. Mengenai adopsi dan implementasi TQM, 11% responden menyatakan bahwa perusahaan mereka menggunakan TQM. Mayoritas responden (79%) berpendapat bahwa kualitas produk/jasa mereka dan hubungan dengan supplier dan pelanggan telah meningkat dengan implementasi program peningkatan kualitas di perusahaan. Mayoritas responden (4%) juga menyebutkan bahwa merubah kebiasaan dan tingkah laku para pegawai di perusahaan merupakan tantangan terbesar dalam implementasi TQM. Riset ini merekomendasikan agar kontraktor meningkatkan adopsi dan implementasi TQM dalam organisasi mereka untuk menghadapi tantangan dimasa depan demi mewujudkan visi sebagai perusahaan kelas dunia.



**Keywords:** implementasi TQM implementation, produktifitas, keuntungan, kontraktor, Semarang

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# CHAPTER I

# INTRODUCTION

## 1.1 Background

Total Quality Management (TQM) and Continuous Improvement (CI) has become a focal point of most organizations. A recent study conducted on TQM within the top 100 U.S. construction firms as ranked by Engineering News Record, found that 69% confirmed that they did have a quality management program. Given this level of quality saturation within the top 100 U.S. construction firms it leads one to believe that quality management must be addressed in construction education. This means that quality management should not only be taught, but it should be implemented and effectively utilized within the construction education department or program. However, implementation of a quality management or continuous improvement philosophy within an academic setting is met with an extreme paradox. This paradox is that the student is often considered the customer, the product, and even the employee of the process ( Cox, 1996).

There is great potential for quality improvement in the construction process. A study of the literature and of surveys conducted in the USA indicted that measurment commitment to quality and to continuons quality improvement is very importannt; construction industry professionals are well aware of the importance of quality traning ; partnering agreements among the parties in the construction process contiute an important step in securing a high quality product; feedback loop could upgrade the original quality standards used in the industry; the clarity of project scope and requirements as well as of drawings and specifications is a prerequisite for high process quality (Arditi and Gunaydin, 1997).

Quality is one of the critical factors in the success of construction projects. Quality of construction projects, as well as project success, can be regarded as the fulfillment of expectations (i.e. the satisfaction) of the project participants (Ahmed et al., 2005).

Unlike manufacturing and service industries, where a standard product is regularly produced, most products of the construction industry are one-offs, specially designed for a specific purpose. Hence, attainment of a quality level is difficult both to specify and to

monitor (Ahmed and Kangari, 1995). Quality assurance and quality management systems are topics which have recently received increasing attention worldwide (Ahmed et al, 2005).

The primary purpose of Total Quality Management (TQM) is to provide excellence in customer satisfaction through continuous improvements of products and processes by the total involvement and dedication of each individual who is in any way, a part of that product/process (Ahmed and Kangari, 1995). TQM involves a strong commitment to two guiding principles: *customer satisfaction* and *continuous improvement*. The principles of TQM create the foundation for developing an organization's system for planning, controlling, and improving quality (Deffenbaugh, 1993).

TQM is a structured approach to improvement. If correctly applied, it would assist a construction company in improving its performance. While problems such as rework, scrap, delivery delays etc. may be minimized by adopting a Quality Assurance (QA) program, issues like unnoticed delays, frustration, redundant internal efforts, over-control, manpower inefficiency, low morale etc., which are largely hidden, can only be exposed and cured by adopting TQM (Ahmed and Ahmad, 1997). In 1992, the Construction Industry Institute in Austin, Texas, published guidelines for implementing TQM in the engineering and construction industry. Their results showed that TQM resulted in improved customer satisfaction, reduced cycle times, documented cost savings, and more satisfied and productive work forces (Burati et al., 1991).

Inspection traditionally has been one of the key attributes of a quality assurance/quality control system in the construction industry. Regarding inspection, Deming says, "Routine 100% inspection is the same thing as planning for defects - acknowledgement that the process cannot make the product correctly, or that the specifications made no sense in the first place. Quality comes not from inspection, but from improvement of the process" (Deming, 1982). This does not mean that inspection ceases. Instead, it means that more effort is put into preventing errors and deficiencies.

In 2002, the UK Strategic Forum for Construction report Accelerating Change called for the UK construction industry to adopt best practice in performance measurement and continuous improvement from other sectors by introducing the following into their way of doing business: 'A culture of continuous improvement based on performance measurement. Consistent and continuously improving performance, and improved profitability, making it highly valued by its stakeholders (Cain, 2008).

## 1.2 The Problem of Statement

When it comes to measuring work process, the construction industry does not a good reputation. The problem, however, can be attributed to the nature of the industry, which lacks solid data gathering and exceptional fluctuation in productivity.

## 1.3 The Objectives of Study

TQM places emphasis on prevention, not correction. The goal is work that is 100% free of errors, free of accidents, and 100% free of waste. The name of the game is to do things right the first time, eliminating waste and rework.

The primary objective of this study will lead to an overall improvement of quality, productivity and the competitiveness of the Semarang construction industry specifically; the aims and objectives of this research project are to:

1. To investigate the knowledge of TQM among the contractors in Semarang.
2. To investigate the adoption and implementation of TQM in the construction industry in Semarang.

## 1.4 The Scope of Study

This project proposes to investigate the adoption and implementation of TQM in the Semarang construction industry. It is expected that this study was a pioneering nature. For the local construction industry, this project has the potential of demonstrating tangible benefits of using TQM in their organizations. This will fulfill by showing that quality improvement efforts can be quantified, measured, and analyzed - thereby enabling the construction company to continuously improve its products and services to meet and even exceed customer requirements.

## 1.5 The Limitation of study

This study will focus on the measurement of construction processes for continuous improvement through customer satisfaction to measure the company’s overall performance in the eyes of its customers in construction firms in Semarang city.

## 1.6 The Organization of Thesis

The thesis is logically organized into six (6) chapters and appendices:

**Chapter one** is the introduction and is composed of background, problem of statement, objectives of study, scope of study, and limitation of study.

**Chapter two** compries literature review of all terminologies of TQM, quality eavolution, Analysis of Management characteristics, historical perspective of TQM, critical success factors in TQM, general model for implementing TQM, other quality systems and quality improvement techniques.

**Chapter three** describes in detail the methodology followed in this research study.

**Chapter four** contains the results of questionnaire analysis taken from the respondents (contractors' employees).

**Chapter five** is the discussion of the results of this research.

**Chapter six** contains conclusions of the research and recommendations.

# CHAPTER II

# LITERATURE REVIEW

## 2.1. Introduction

For the last few decades Total Quality Management (TQM) techniques have been used extensively and beneficially in the area of manufacturing and industrial engineering to control process and prevent defects before they happen, ultimately saving millions of dollars. TQM focuses on the quality of management systems, not the management of quality, on continuous improvement of process in order to improve every facet of an organization. The implementation of TQM is fundamentally a process of culture change (Ahmed, 2002).

## 2.2 Quality and learning

There is no universally accepted definition of quality and, as such an organization will need to develop its own working definition that will find its origin in the organization's vision (Chapman et al., 1997; Groth, 1995;Lau and Anderson, 1998; Sinclair and Zairi, 1995; Reeves and Bednar, 1994;Srinidhi, 1998). Therefore, the meaning of quality will be peculiar to individual organizations with different definitions of quality appropriate under different circumstances (Reeves and Bednar, 1994).

During the evolution of quality the terminology used to describe the quality movement changed without any clear declaration and at some point the term total quality management (TQM) began to be used instead of total quality control or just quality control (Dahlgaard, 1999). Today TQM is the term generally used to describe quality practices within organizations. TQM can be regarded as a management approach characterised by three core principles: customer focus; continuous improvement; and employee involvement (Dean and Bowen, 1994; Evans and Lindsay, 1996; Sitkin et al., 1994; Yong and Wilkinson, 2001). It is suggested that the success of TQM is dependent on an organization's ability to learn, to absorb, to adapt and to apply conceptual changes and integrate them throughout the organization (Ford, 1991, cited by Terziovski et al., 2000). The ability to learn new sets of skills on a continuing basis represents a sustainable source

of advantage for the future (Liedtka and Rosenblum, 1996; Sambrook and Stewart, 2000; Tranfield et al., 2000); suggesting continuous improvement will be achieved if learning takes place within the organization (Bessant and Francis, 1999; Egan, 1993).

A learning focus will encourage employees to provide feedback to evaluate performance, enabling the outcomes of the continuous improvement activities to be incorporated into the knowledge base within the organization. From this knowledge base, it allows future improvement to be built on past accomplishments (Jha et al., 1996).

Organizational learning has been described as the process of improving actions through better knowledge and understanding (Fiol and Lyles, 1985; Huber, 1991). With the objective of maintaining or improving performance based on experience (Wick and León, 1995; DiBella and Nevis, 1998). It can be viewed as a characteristic of an organization that is observed through the actions of the parts and describes certain types of activities or processes that may occur at several levels of analysis (for example, individuals, teams and companies). Organizational learning can be found in any organization, but the learning organization will embody organizational learning in all its actions and exemplifies the ideal application of organizational learning. Learning organizations are those that purposefully construct structures and strategies so as to enhance and maximise organizational learning (Dodgson, 1993, p. 377). Terziovski et al. (2000) carried out field research to examine the mutual dependence between TQM and the learning organization. They concluded that the success of the companies' quality programs was due to the sustained commitment to "learning" and will involve the process of building procedural knowledge, cognitive strategies and attitudes. Learning can concentrate on methods and tools to improve what is already being done, known as single-loop learning, or on testing the assumptions underlying what is being done, known as double-loop learning. Organizations may have a preference for one mode over the other, but a sound learning system requires both approaches (Appelbaum and Reichart, 1997).

Organizational learning is operationalised through organizational learning mechanisms (OLMs), which are the institutionalized structural and procedural arrangements that aid the learning process (Lipshitz and Oz, 1996). Such mechanisms allow organizations to collect, analyse, store, disseminate and use information that is relevant to the organization. It is due to the existence of such "mechanisms" that organizational learning can be studied as an actual phenomenon. OLMs enable the experiences of individual organizational members to be analyzed and shared by other

organizational members. The experience becomes the property of the entire organization through distribution of lessons learned to relevant units or through changes in standard operating procedures (Lipshitz and Popper, 2000).

Therefore, learning can be viewed as the foundation for improvement activities. It provides the organization with the capabilities to take action and without which any attempts at improvement will possibly fail (Bessant and Francis, 1999; Wick and León, 1995). Learning can assist an organization in its quest for continuous improvement by helping to avoid repeating mistakes; building sensitivity to the changing world so that the organization can adapt better; and improving operations by understanding the weaknesses in the past and identifying how to correct them (Lee, 1995). Learning will be seen to have occurred when an organization performs in changed and better ways (Dodgson, 1993). Perhaps the underlying reason behind the lack of success of some quality programs is that the processes put in place lack the necessary cues for quality learning. This research may contribute to an understanding of whether a lack of learning is inhibiting the success of quality programs (Http// emeraldinsight.com).

## 2.3 Management Control System.

The management control system (MCS) can be viewed as the organization's control package, with components such as of the accounting information system (cost systems and budget systems), performance measurement and reward systems and planning systems. However, in reality it could be any system to monitor and assist work practices. An organization's MCS can empower organizational learning through its design features and interactively influence strategy (Simons, 1990) and there by act as an OLM. Control is the continuing process of evaluating performance and taking corrective action when necessary and enabling the organization to maintain high quality processes, and also to bring processes under control in order for improvements to be made (Evans and Lindsay, 1996). As noted by Simons (1991, p. 49) the MCS is influential on organizational activity as it represents "…the formalized routines and procedures that use information to maintain or alter patterns in organizational activity, therefore, if the MCS is structured to support the learning environment it should be a system that supports decision-making, facilitates rapid and effective learning and unlearning, and enables the acquisition and development of information, knowledge and understanding. The MCS sets a framework for an organization's information seeking, accountability and feedback designed to ensure that it

adapts to changes in its environment (Kloot, 1997; Lowe, 1971). As noted by Simons (1991) control systems allow employees to access information to undertake their tasks, and also provide direction in the accomplishment of those tasks by providing information necessary for feedback and control. MCS are an important element of strategy implementation by translating the plans into action (Simons, 1992). The MCS should support and put into practice the operating philosophies of continuous improvement, and be adaptable to revision whenever changes are made to the operating strategy (Banker et al., 1993; Bessant and Francis, 1999).

The ability of an organization to adapt successfully to changes in the competitive environment can be seriously inhibited by a poorly designed performance measurement system (Sinclair and Zairi, 1995). “Ownership” of the measurement system is important to embed the behaviour that promotes improvement (Bessant and Francis, 1999), and those directly involved in the continuous improvement process should be involved in its operation and implementation. The performance measurement system is a key enabler to encourage improvement as it gives focus to improvement activities and assists in the identifying the extent to which performance has changed (Bessant and Francis, 1999).

This can be achieved if an organization is able to define, in specific performance terms, what it means by quality and then to measure these performance variables objectively (Krishnan et al., 1993). Without an appropriate performance measurement system, improvement activities can fail (Banker et al., 1993; Chapman and Hyland, 2000).

It is suggested by Oakland (1993) cited by Sinclair and Zairi (1995) that appropriate performance measurement systems play the following roles in quality and productivity improvement: ensures customer requirements have been met; provides standards for establishing comparisons; provides visibility and provides a “scoreboard” for people to monitor their own performance levels; gives an indication of the costs of poor quality; justifies the use of resources; and provides feedback for driving the improvement effort. Employees should be able to monitor and (if necessary) change their actions based on the feedback gained from comparing actual performance against target. For example,Chapman and Hyland (2000) concluded from a study of small-to-medium Australian manufacturing organizations that there was a low level of correlation between the competitive measures and the motivation for continuous improvement or content of the continuous improvement program. They also identified that the measurement system often did not include a closed feedback loop and any learning that did take place was usually localised owing to the

absence of any effective information collection and storage mechanisms. Therefore, a well-structured measurement system provides the linkage between strategies and actions. The links are established by the performance goals developed to encourage employee behaviour to meet the organization's objectives and facilitate and support induced quality learning by incorporating goal-setting feedback as an essential component of the system. Goals are broad statements that set the direction for the organization in realising its mission and closing the gap between where it is and where it wants to be (Evans and Lindsay, 1996).

The goals need to be consistent with the key factors that drive the business and must not undermine quality. Fine (1986)argues that to achieve cost reduction and productivity improvement the performance measurement system should support quality-based learning by making use of frequently revised goals. Further support to the benefits of performance goals is found in the goal setting literature which identifies that individuals with specific and hard or challenging goals outperform individuals with specific easy goals, do-best goals, or no assigned goals (Dossett et al., 1979; Locke et al., 1981). A review of all available experimental field studies on goal setting found that when goals are set the median improvement in productivity and quality was 16 percent and when combined with monetary incentives, median performance was improved by more than 40 percent (Lockeet al., 1981). Quality goals are the central focus of an effective quality program and should be supported by a strong measurement system and must be quantifiable (Lau and Anderson, 1998). Such quantitative measures allow specific goals to be established and specific results to be forecast and also provide the basis for clear company-wide quality discussions at all levels of the organization. This will provide a higher level of precision for discussing results. If such measures are clear it should lead to worker acceptance and commitment. To provide more meaning to employees, the organization needs to translate the quality goals into operational goals.

Chapman et al. (1997, p. 433) identified best practice in relation to performance measurement by examining organizations that have won Australian quality awards (Chapman et al., 1997, p. 433). Best practice attributes identified included: Goals, priorities and targets, which are clear and unambiguous to all employees. These have been deployed throughout the organization while retaining alignment to organization-wide improvement strategies. Quantifiable goals with measurement/benchmarking processes to provide clear indications of progress towards the goal. Competitor benchmarking in the area of customer

satisfaction is a continuing activity and the information is fed into the strategy and goal setting process.

Data collection and analysis relating to key internal processes are a fundamental part of routine work. Results of such measurement are used to produce revised goals and targets. Specific performance goals or targets to support quality have also broadened with the move from quality control to TQM (Dahlgaard, 1999). Initially, quality was measured in defect rates, complaint rates, returns, etc., and has now extended to measures with a focus on customers and employees. However, it has been suggested that the poor performance of many new TQM initiatives can be accounted for by the continued reliance on out-dated traditional performance measures that focus on the financials. As mentioned by Oakland (1993) the key success factors today are not easily found in the financials, and the focus should be on customer satisfaction and non-financial information relating to the work effort and to costs relating specifically to quality. It is suggested that goal conflicts can be avoided by ensuring that goals are consistent, subsume other goals and are sequentially prioritised. Consensus on what goals to pursue helps to avoid confusion caused by simultaneously pursuing multiple quality programs (Krishnan et al., 1993).

The goals need to be consistent with the key factors that drive the business and must not undermine quality. For example, Lincoln Electric, a US manufacturer, gave employees no credit for units that did not meet the quality standard so as to ensure there was no quantity/quality trade off (Wright, 1994). Daniel and Reitsperger (1992) suggest if quality is a strategic priority then the provision of quality targets and feedback to operating management should reflect the importance of quality improvement and emphasise the importance of continuous improvement. A study undertaken in New Zealand explored the changes in the management accounting system (MAS) in relation to performance measures as a result of a TQM implementation (Hoque and Alam, 1999). Pre-TQM the organization's MAS was historical and financial accounting orientated and post-TQM the organization recorded both financial and non-financial events of the company. Managers from the research site "expressed a high degree of satisfaction with the post-TQM MAS (management accounting system) helped them coordinate, plan and communicate the TQM related work to the best interests of the company.

## 2.4 Total Quality Management

TQM is a management philosophy, a paradigm, a continuous improvement approach to doing business through a new management model. The TQM philosophy evolved from the continuous improvement philosophy with a focus on quality as the main dimension of business. Under TQM, emphasizing the quality of the product or service predominates. TQM expands beyond statistical process control to embrace a wider scope of management activities of how we manage people and organizations by focusing on the entire process, not just simple measurements. TQM is a comprehensive management system which:

- Focuses on meeting owners'/customers' needs by providing quality services at a cost that ovides value to the owners/customers
- Is driven by the quest for continuous improvement in all operations
- Recognizes that everyone in the organization has owners/customers who are either internal or external
- Views an organization as an internal system with a common aim rather than as individual departments acting to maximize their own performances
- Focuses on the way tasks are accomplished rather than simply what tasks are accomplished
- Emphasizes teamwork and a high level of participation by all employees

### 2.4.1 TQM Beliefs

Presented here are universal total quality management beliefs.

- Owner/customer satisfaction is the measure of quality.
- Everyone has owners/customers; everyone is an owner/customer.
- Quality improvement must be continuous.
- Analyzing the processes used to create products and services is key to quality improvement.
- Measurement, a skilled use of analytical tools, and employee involvement are critical sources of quality improvement ideas and innovations.
- Sustained total quality management is not possible without active, visible, consistent, and enabling leadership by managers at all levels.
- If we do not continuously improve the quality of products and services that we provide our owners/customers, someone else will (PHCC Educational Foundation, 1996).

## 2.5 Characteristics of Successful TQM Companies

The construction industry has arrived late to TQM, probably due to the tendency to easily brush aside anything in management that is new, or to dismiss TQM as a fad Continuous improvement is not a fad but a necessary part of management's obligation to properly run its company. Gone are the boom days when quality did not matter due to the volume of work available and the ease of obtaining work. The attitude of construction managers and contractors was simply to add it to the bill, because the owner will pay for it. In other words, in those boom days Cost plus Profit equaled Price. Now, however, the new attitude is Price minus Cost equals Profit. Owners are now demanding higher quality work, and at a lower cost. In attempting to keep pace with the new attitude, a quality management system that helps keep costs down is well worth implementing.

The characteristics that are common to companies that successfully implement TQM in their daily operations are listed here.

- Strive for owner/customer satisfaction and employee satisfaction
- Strive for accident-free jobsites
- Recognize that the owner/customer provides the revenue while the employees are responsible for the profit
- Recognize the need for measurement and fact-based decision making
- Arrange for employees to become involved in helping the company improve
- Train extensively
- Work hard at improving communication inside and outside the company
- Use teams of employees to improve processes
- Place a strong emphasis on the right kind of leadership, and provide supervisors with a significant amount of leadership training
- Involve subcontractors and suppliers, requiring them to adopt TQM
- Strive for continuous improvement Quality principles that successful TQM companies recognize the quality principles that successful TQM companies recognize and attempt to continually incorporate into their actions are the following:
- People will produce quality goods and services when the meaning of quality is expressed daily in their relations with their work, colleagues, and organization.

- ❖ Inspection of the process is as important as inspection of the product. Quality improvement can be achieved by the workers closest to the process.
- ❖ Each system with a certain degree of complexity has a probability of variation, which can be understood by scientific methods.
- ❖ Workers work in the system to improve the system; managers work on the system to improve the system.
- ❖ Total quality management is a strategic choice made by top management, and must be consistently translated into guidelines provided to the whole organization.
- ❖ Envision what you desire to be as an organization, but start working from where you actually are.
- ❖ Studies have indicated that people like working on a quality-managed jobsite especially due to the cleaner site and safer place to work.
- ❖ Accept the responsibility for quality. Establish datum's for measurement.
- ❖ Use the principle of get it right, the first time, every time.
- ❖ Understand that quality is a journey, not a destination. It consists of steps that form a process that is continuous. The goal of management is to create a culture of quality across the entire project site--get the job done right, the first time, every time. As in the airline industry where 99-percent quality is not

## 2.6 Total Quality Management & Constructability

During recent years, the use of TQM has spread beyond the manufacturing industry to Construction. Organizations embracing TQM are adopting a management philosophy that makes quality a strategic objective for the organization. Successful application of TQM to constructor has increased its recognition as an effective method to improve quality and productivity. TQM has two principal objectives: (1) customer satisfaction and (2) continuous improvement. Within the construction industry, each party involved on a project, including the owner, constructor, and designer, plays the role of customer and supplier of services. The owner supplies the requirements to the designer, the designer supplies the plans and specifications to the constructor, and the constructor supplies the built facility to the owner. A principal focus of TQM is for each supplier of services to identify and satisfy or exceed their customer's needs in terms of cost, quality, and time.

Continuous improvement not only involves problem solving on projects but also a proactive search for methods of completing a task more efficiently. The first step of the

process is problem avoidance. That is, looking and accounting for areas that may later cause problems. In the construction industry, this means making a formal effort to recognize problems during the planning and design phases instead of discovering problems during construction. The second step in continuous improvement is identifying methods that increase productivity including technological innovations. Both steps towards continuous improvement create progress toward more productive and higher quality construction. However, these steps must be accompanied by a method of measuring the progress and cost effectiveness of the TQM program. This assures that quality and productivity are not only increased but also maintained. Measurement of cost effectiveness may also be used to increase corporate awareness and commitment by showing the financial benefits accrued as a result of the TQM process. A constructability system can enhance customer satisfaction by facilitating teamwork among owner, designer, and constructor representatives as early as the planning phase of a project. By so doing, it provides more resources, including construction knowledge and experience, for planning and designing a quality project that maximizes construction productivity. (Deming, 1996)

Constructability is a means of continuous improvement in several respects. Maintaining a Lessons-learned database allows communication of positive and negative activities and experiences from one project to future projects. Thus, improvements and innovations can be implemented in future designs. Also, construction personnel may be more aware of innovations in equipment or construction techniques that may play a key role in improving designs. Measurement of program effectiveness is also a key aspect of both a TQM and constructability program. This includes tabulating quantitative costs and benefits stemming from constructability and TQM such as dollar and schedule savings, as well as recognizing qualitative effects such as higher quality and increased customer satisfaction.(Deming, 1996)

TQM and constructability both stress commitment from all personnel. This commitment must be established from the executive level to the construction craftsmen on the site. This is a proactive process requiring teamwork, recognition of the need for education regarding the program, and a self assessment regarding capabilities and resources available to achieve the desired goals.( Haider, 2009).

## 2.7 Performance Measurement

A quality system is not complete without some form of evaluation that provides us with data turned into information, and information into decisions that will consistently lead us to continuous improvement. The performance of the educational system can come in many areas. One can look at the such things as: grade point averages, cost per student hour, student placement, average annual salaries reports from job placement, hiring ratios of graduating seniors, refereed publications by faculty and students, research funding, completion rates, and even the number of students who's relatives attended the program. This leads to such other measures as accreditation and newly developed course approvals, as well as innovative delivery systems and ideas. In any case, it is up to the developers of the system to consciously define the key performance indicators for their system. This must be done in conjunction with the design, development, and enhancement of an effective performance measurement system that will promote continuous improvement (Arditi and Gunaydin, 1997).

## 2.8 Strategies For Implementation Total Quality Management

Many strategies exist for the implementation of total quality. Guides are available for reengineering that have much to offer a leader of the TQM movement. Some are provided in following paragraphs.

### 2.8.1 Clear and Engaging Leadership

Leadership is based upon a common thread between those who lead and those who follow into the same moral and emotional commitments. Implementing TQM is a never ending process that must be constantly and genuinely supported by the leadership of the organization. This means that in order to accomplish this effort at the respective levels of a university structure, the program chair, department head, dean, and / or president must take a proactive role in ensuring that the followers understand the changes and are motivated to make the transformation to total quality. The move to total quality philosophies requires the leader(s) to understand and communicate to everyone before, during, and after the implementation begins. According to Deming, the successful leader must possess Profound Knowledge. The concept of Profound Knowledge requires a clear level of understanding systems, variation, theory, and psychology. While some styles of leadership may lend themselves to implementing TQM, it is apparent that leading the transformation requires

the proper mix of leadership styles and theories. In fact, there is not a single leadership style that will ensure successful implementation of TQM Philosophies, but it is critical to the effort that the leader must be willing to use their power to the best interest of all involved.

### 2.8.2 Develop a Plan

It is hard to conceive a contractor ever building a project without a set of plans. So too should be the case when dealing in organizational change, there must be a formalized plan. To borrow a productivity textbook's concept of planning, it suggests that one must 'plan the preplan with passion'. When implementing total quality the concept of false starts comes to mind and it is important to understand whether or not your plan failed, or did you simply fail to plan.

### 2.8.3 Provide Direct Access to Customers

Direct access for both internal and external customers allows for timely and accurate responses to customer needs and expectations. There has already been a long discussion about the many customers of education and their points of view. No matter the identity of our customer, internally or externally, there must be a direct link from the customer(s) to the value adding process through advisory councils, surveys, student exit interviews, employer surveys, etc...

### 2.8.4 Embrace Technology

Change is enhanced through technology. In fact many times technology is the catalyst for change. With respect to a quality movement in education, technology is the leading component for new directions being faced today. Some of which include distance learning, CD-ROM, virtual reality classrooms, internet, and integrated information technologies that give students and faculty access to virtually everything in real time. Technology will play the largest role in the movement to implement total quality, because the customer has immediate access to the system via electronic means for both information access and feedback.

### 2.8.5 Promote Interdependence

Effective cross-communications and functionality provides for actions to take place simultaneously instead of linear. Although each portion of the system is responsible for different sub processes, an integrated approach for technology, information, and problem solving will improve the implementation and continuous monitoring. This also reinforces the importance of understanding internal customers and the dependency of outputs from one another which serve as the input of the next.

### 2.8.6 Involvement Promotes Acceptance

Based on the idea that participation increases ownership, commitment, and loyalty of everyone involved, quality leaders must develop and support a team effort to ensure success.

### 2.8.7 Lead by Example

Remember, don't do as I say, do as I do. In order to truly lead the changes to total quality, top level persons must genuinely show their support and dedication to through their own actions. Don't ever expect others to do anything that you're not willing to do. Change affects everyone in the system, so this example will soften the transition.

### 2.8.8 Scope of Implementation

Remember, the scope of quality implementation should not exceed the level of control or influence of those leading the implementation. In addition, limit the scope to those processes that need improvement. Perhaps even those processes that need the most improvement, but don't attempt something that is perceived as impossible. Concentrate on those processes that can be accomplished and share inputs and outputs. By doing so, an environment of shared necessity is created and everyone has a stake in the situation. This is compounded by the heightened level of awareness with internal customers as output become inputs, and so on. (Cox, 1996)

## 2.9 QUALITY EVOLUTION

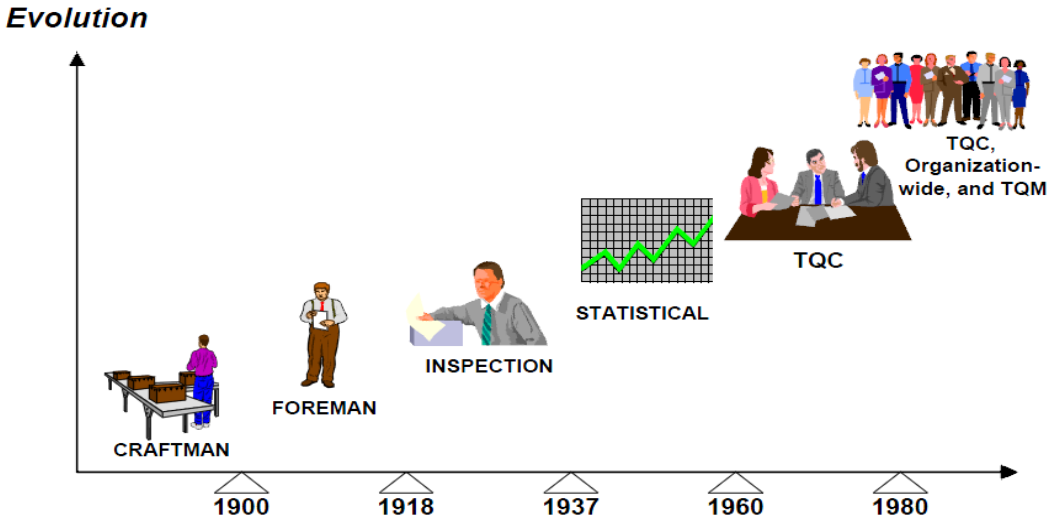



**Figure 2.1** Quality Control Evolution (Source: Feigenbaum (1991).

There are five stages in the evolution of quality control, as defined by Rounds and Chi (1984) and Feigenbuam (1991):

- Craftsman quality control was inherent in manufacturing up to the end of nineteenth century. At that time, a very small number of craftsmen were responsible for the manufacturing of a complete product and each craftsman exclusively controlled the quality of his work.
- Foreman quality control occurred during the industrial revolution when the large-scale modern factory concept developed. During this stage, many craftsmen performing similar tasks were grouped together and supervised by a foreman, who then assumed responsibility for the quality of their work.
- Inspection quality control evolved during the First World War when the manufacturing systems became more complex. Because a large number of craftsmen reported to each production foreman, full-time inspectors were required. This era peaked in the large organizations in between 1920s and 1930s.
- Statistical quality control flourished during the Second World War when tremendous mass production was necessary. In effect, this step was a refinement of the inspection step and resulted in making the large inspection organizations more efficient. Inspectors were provided with statistical tools such as sampling and control charts. W.A. Shewhart developed a statistical chart for the control of product

variables in 1924, marking the beginning of statistical quality control. Later in the same decade, H.F. Hodge and H.G. Roming developed the concept of acceptance sampling as a substitute for 100% inspection; this was considered the most significant contribution of statistical quality control.

- Total quality control evolved in the early 1960s in a four-phase process. A dramatic increase in user quality requirements resulted in increasing customer demand for higher-quality products, leading the manufacturer to recognize the inadequacy of existing in-plant quality practices and techniques. All these contributed to excessive quality cost, due to such items as inspection, testing, laboratory checks, scrapping and reworking imperfect products, and customer dissatisfaction. These problems highlighted the dual quality challenge: Providing significant improvement in the quality of products and practices while at the same time, effecting substantial reductions in the overall cost of maintaining quality. Statistical quality control could never meet the challenge; thus, a totally new concept was developed based upon the principle that in order to provide genuine effectiveness, control must start with the design of the product and end only when the product has been placed in the hands of a customer who remains satisfied (Feigenbuam, 1991).

## 2. 10 Characteristics of the Construction Industry

Construction works are carried out in the form of project. Projects are becoming progressively larger and more complex in terms of physical size and cost. In the modern world, the execution of a project requires the management of scarce resources; manpower, material, money, and machines to be managed throughout the life of the project – from conception to completion. The projects have five distinctive objectives to be managed: scope, organization, quality, cost and time (Figure. 2.2). Construction work requires different trades and knowledge but the management, scheduling, and control of those projects utilize the same tools and techniques, and are subject to constraints of time, cost, and quality. There are also unique characteristics of project, which differ from routine operations.

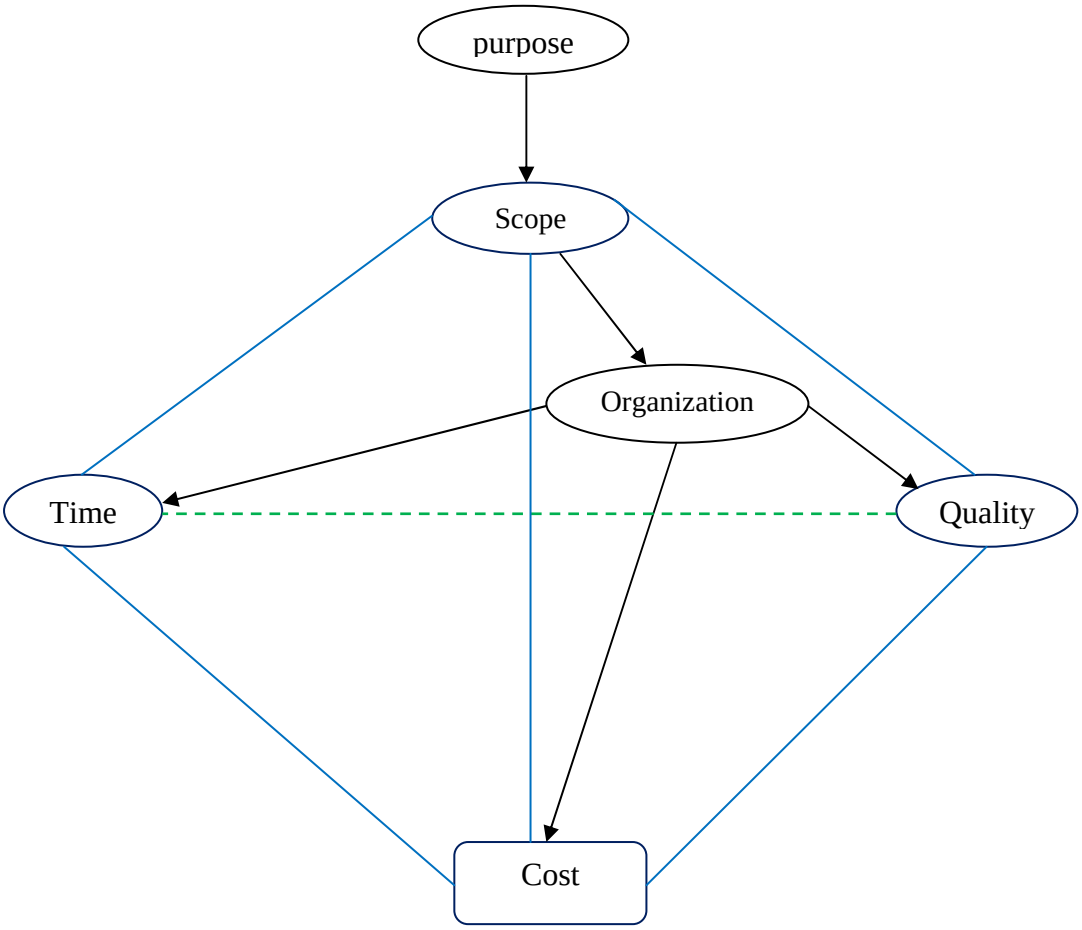



**Figure. 2.2** Objectives of Project (Ahmed, 2002).

### 2.11 Critical Success Factors In TQM

TQM has gained widespread global acceptance. However, some have achieved remarkable success while others have suffered dismal failures. Many of the failures can be attributed to a misunderstanding of TQM or the way the organization had implemented TQM.

#### 2.11.1 Customer Focus

In the TQM philosophy, total customer satisfaction is the goal of entire system, and a pervasive customer focus is what gets us there. The function of the construction industry is to provide customers with facilities that meet their needs. For a company to remain in business this service must be provided at a competitive cost. TQM is a management philosophy that effectively determines the needs of the customer and provides the framework, environment, and culture for meeting those needs at the lowest possible cost.

By ensuring quality at each stage in the construction process, and there by minimizing costly rework, as well as other costs, the quality of the final products should satisfy the final customer. By definition, customers may be either internal or external. The external customer is the consumer or client, in other words the end user of the products or services being offered. An internal customer is a second process or department within the organization, which depends on the product of the first. For example, for designers the products are plans and specifications, and the customers are the owner and the contractor responsible for the construction. For the contractor, the product is the completed facility, and the customer is the final user of the facility. There are also customers within the construction organization. These internal customers receive products and information from other groups of individuals within their organization. Thus, satisfying the needs of these internal customers is an essential part of the process of supplying the final external customer with a quality product. Every party in a process has three roles: supplier, processor, and customer. Juan defined this as the triple role concept. These three roles are carried out at every level of the construction process. The designer is a customer of owner. The designer produces the design and supplies plans and specifications to the contractor. Thus, the contractor is the designer's customer, who uses the designer's plan and specifications to carry out the construction process and supplies the completed facility to the owner. The owner supplies the requirements to the designer, receives the facility from the contractor, and is responsible for the facilities operation (Burati 1992).

This clearly illustrates that construction is a process, and that TQM principles that have been applied to other processes are potentially adaptable to the construction industry. (Figure. 2.3)

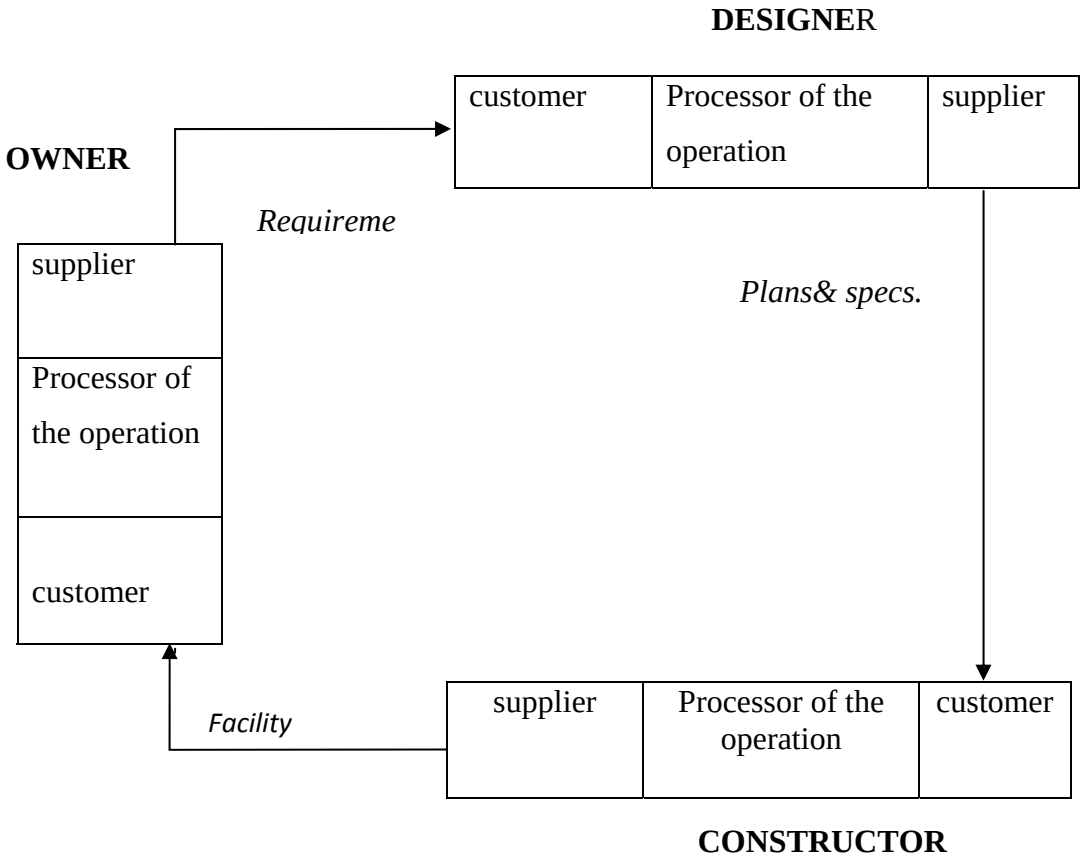



**Figure. 2.3** Juran's Triple Role concept Applied Construction (Ahmed, 2002)

### 2. 11. 2 Process Improvements

A process is a way of getting things done. A process consists of the tasks, procedures and policies necessary to carry out an internal or external customer need (Adrian 1995). According to the TQM philosophy if the process is correct, so will be the end result (product). Thus the organization should work to improve the process so as to improve the end product or service. Three different approaches have emerged for improving the efficiency or effectiveness of a process. Continuous improvement is an approach used on an ongoing basis for incremental gains. Benchmarking should be used periodically, and reengineering can be launched occasionally to achieve dramatic breakthrough. By focusing on process by measurement and analysis, a process can possibly be improved by changing five M's of the process namely man, machine, material, method and measurement. A strong emphasis in process improvement centers on measurement of variation, the control of variation, and the knowledge of variation to seek improvement. This analysis is referred

to as mstatistical process control or statistical analysis. This is at the center of process improvement. The objective of measuring the variation in a process is to learn how to control the variation and also how to improve the process by viewing variation as a tool for improvement. The analysis of the positive side (good performance or quality) of the variation of process is referred as a “breakthrough improvement” or “breakthrough management” which is another key component of TQM (Arditi and Gunaydin 1997).

### 2. 11. 3 Continuous Improvements

The goal of continuous improvement is common to many managerial theories; however, what differentiates TQM is that it specifies a specific step-by-step process to achieve this. This process consists of nine steps as below: Identify the process, Organize a multi-disciplinary team to study the process and recommend improvements, Define areas where data is needed, Collect data on the process, Analyze the collected data and brainstorm for improvement, Determine recommendations and methods of implementation, Implement the recommendations outlined in step six, Collect new data on the process after the proposed changes have been implemented to verify their effectiveness, and Circle back to step five and again analyze the data and brainstorm for further improvement.

The nine-step cycle emphasizes on: focusing the progress, measuring the process, brainstorming for improvement and verification and re-measurement. These four elements are further illustrated in Deming’s Plan-Do-Check-Action (PDCA) diagram shown in Fig. 2.4. The PDCA diagram stresses removing the root cause of problems and continually establishing and revising new standards or goals (Deming, 1986).

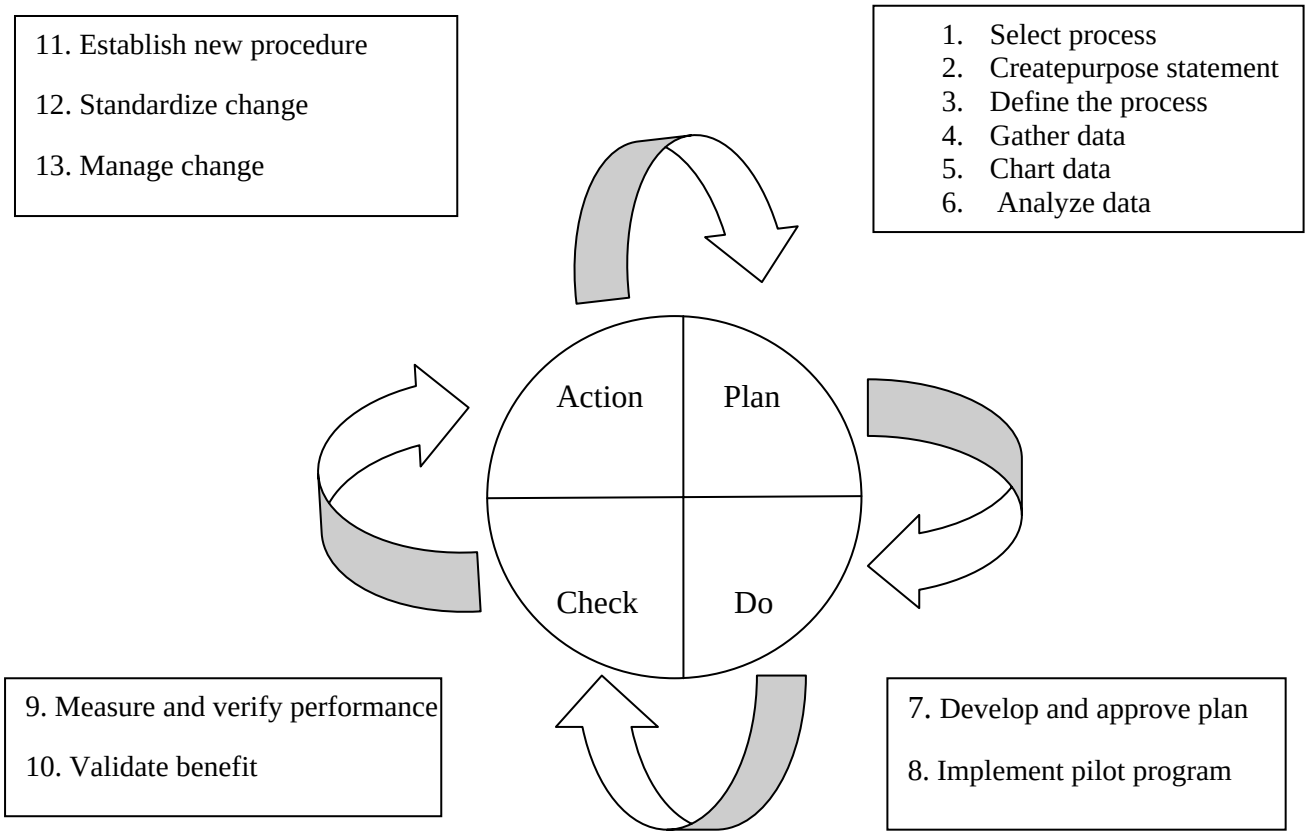



**Figure. 2.4** The PDCA Diagram (Ahmed, 2002).

Under TQM, management in the construction industry has two functions: (1) To maintain and improve current methods and procedures through process control and (2) To direct efforts to achieve, through innovation, major technological advances in construction processes. The incremental improvement of the process is achieved through process improvement and control. In every construction organization there are major processes by which all the work is accomplished. However, there are innumerable parts in the construction process. Through the use of flow diagrams, every process can be broken down into stages. Within each stage, input changes to output, and the methods and procedures directing the change of state (i.e. the construction procedures) can be constantly improved to better satisfy the customer at the next stage. During each stage the employees should communicate closely with their supplier and customer to optimize the work process for that stage. This requires each employee to recognize their place in the process and their respective supplier and customer. ( Ahmed, 2002)

## 2.12 Deming's Fourteen Points Total

**Table 2.1** Deming's Fourteen Points total

| | |
|---|---|
| ⇒ Create constancy of purpose for improvement of product and service. (Plan to stay in business.)<br>⇒ Adopt the new philosophy. (Stop tolerating poor quality.)<br>⇒ Cease dependence on inspection to achieve quality. (Improve the process.)<br>⇒ End the practice of awarding business on the basis of price tag alone. (Seek longer-term supplier relationships; reduce the number of suppliers.)<br>⇒ Improve constantly and forever every process in the system of planning, production, and service.<br>⇒ Institute modern training (for everybody!).<br>⇒ Institute modern methods of supervision. (The responsibility of foremen must be changed from sheer numbers to Quality). | ⇒ Drive out fear. (Encourage employees to speak up.)<br>⇒ Break down barriers between departments.<br>⇒ Eliminate slogans, exhortations, and targets for the work force.<br>⇒ Eliminate work standards that prescribe numerical quotas.<br>⇒ Remove barriers to pride in workmanship. (Poor supervisors, poor materials, inadequate equipment, lack of training, etc.)<br>⇒ Institute a vigorous program of education and self-improvement for everyone.<br>⇒ Place everybody in the company to work to accomplish the transformation and create a Structure in top management that will push every day on the above points. |

## 2.13 How does a construction firm begin implementing the process?

How can a construction firm begin the continuous improvement process? Outlined briefly here are the overall target stages for establishing a successful continuous improvement strategy.

**Table 2.2** construction firm begin implementing the process (Deming, 1996)

| **Start setting goals and start meeting the goals you have set.** | **Use measurements to determine how exact your goals are.** |
|---|---|
| Management indicate complete commitment to Continuous Improvement (CI) | Quality can only be achieved when management gives CI a high priority and a clear need. Productivity in the construction industry is estimated to be, at best, 50 percent, with some sources placing it at 35 percent, leaving room for improvement |
| Identify stages | The objectives of continuous improvement are to reduce waste, reduce costs, and increase productivity. The starting point is simple but radical. The work at any construction site can be sliced into a series of stages. The stages can begin with groundbreaking and end with completion. At each stage, a team goes to the jobsite and accomplishes its own work. When the work is completed, it can be handed over to another crew or another contractor. This chain of events can be identified as a process. |
| Establish responsibility | The next step is to establish responsibility for the work. If we define what each team does and establish responsibility for who is to accomplish the task, we have defined a product and an owner/customer. This is the heart of the matter with CI: to define the product and the owner/customer. Each team or crew is responsible for providing a first-class product to its owners/customers. The product must be supplied with no hassles, no concealed errors, and no botched work. |
| Set the datum | CI goes well beyond the concept of quality assurance. Merely relying on a quality product is not the only responsibility of management. Traditional quality assurance simply fixes the product; however, it is not enough that supervisors simply accept or reject faulty work. CI maintains that when something goes wrong, we must find the root cause of the error and correct that cause.<br>What CI means is the setting of a datum so everyone can evaluate his or her work or product by measuring against the datum. CI then becomes everyone working together to improve the way work is actually completed. |

| **Start setting goals and start meeting the goals you have set.** | **Use measurements to determine how exact your goals are.** |
|---|---|
| Pre-Plan | The chain actually starts before breaking ground for the building. It actually starts with an owner/customer who wants the building. We must know what our owners/customers who are going to use the building actually want. We can do this by doing a great deal of pre-planning. The pre-planning involves **creating a team** that is capable of doing the project. We have to ensure that the process used to analyze job segments is in place so we can make the right decisions at the right time and that the flow of information needed to make decisions is in place. A revolutionary idea here is that even the designer can become part of the process of CI from the conceptual stage of the project |
| Regard each project as part of a cycle | We can learn something from each project when we regard each project as part of a cycle. |
| Each worker regard himself or herself as a quality inspector of his or her task | Each worker becomes his or her own quality inspector. In efforts to increase productivity and lower costs, each worker becoming a quality inspector is vital. |

## 2.14 Reasons that occur in companies to quality improvement processes

The reasons to begin establishing quality improvement processes now are several. Study the various areas below to determine which would affect your company in a positive way. It is believed that all of the following would be of great benefit. Cost reasons are discussed at the end of this section, under what are the Benefits of TQM?

**Table 2.3** The reasons to begin establishing quality improvement processes (Deming,1996)

| For Management | For Employee |
|---|---|
| Provides an invaluable problem-solving tool for managers and supervisors to use | Provides opportunity for personal growth and development (as a result of team training activities) and the opportunity to develop and present recommendations |
| Dispels negative attitudes | Increases innovation (through a greater variety of approaches and perspectives) for solving problems, removing fear of failure |
| Management becomes more aware of problems that affect the individual's work environment | Employees use their knowledge and skills to generate data-driven recommendations that will lead to well-informed decision making |
| Employees gain a sense of participation | Employees use their knowledge and skills to generate data-driven recommendations that will lead to well-informed decision making |
| Increases efficiency and productivity | Encourages decision-making at the most appropriate level |
| Reduces turnover rate, tardiness, costs, Eerrors, and scrap & rework | Increases motivation and acceptance of we ideas |
| Improves communications within and among all departments | Increases job satisfaction (as a result of the opportunity to participate in and have influence over work) |
| Develops management skills that were never taught, or are long forgotten due to lack of application | |
| Develops overall company awareness and company unity | Develops mutual respect among employees, management and customers |
| Rearranges priorities which once seemed locked min place | Promotes teamwork |
| Builds loyalty to the company | |
| Reveals training requirements in all departments | |
| Lessens the number of defects received from suppliers when they are encouraged to train in quality management | |

Reducing rework to zero is achievable: Using quality management and CI to reduce rework to nearly zero is an achievable goal. The negative cost of quality, which includes errors, delays, rework, etc., is estimated to be 30 percent of the cost of construction. This figure does not include dissatisfied owners/customers who do not come back for repeat business.

# CHAPTER III
# METHODOLOGY

## 3.1 Introduction

This chapter discusses the methodology utilized to conduct this research study. The data for this research were collected through the use of two (2) questionnaires targeting contractors and clients in the Semarang city. These questionnaires were used to:

1. Investigate the knowledge of TQM among contractors in Semarang.
2. Investigate the adoption and implementation of TQM in the construction industry.

When it comes to measuring work process, the construction industry does not have a good reputation. The problem, however, can be attributed to the nature of the industry, which lacks solid data gathering and the exceptional fluctuation in productivity.

## 3.2 Data Collection

Data collection in a construction project usually lacks consistency in structure and compilation (Choi & Ibbs 1994). Those attempting to measure the performance of construction operations are bound to face difficulties such as incomplete or non-existent data. Unlike manufacturing and service industry where TQM has been successfully adopted and implemented, the temporary nature of construction projects provides little incentive for structured data gathering and analysis. This in turn is bound to have a significant impact on the actual measurement process.

## 3.3 Data Design

A questionnaire was used to collect the data. The draft of the questionnaire was developed from Syed M. Ahmed's (2002) questionnaire modified to suit the companies in the Semarang City.

### 3.3.1 Primary Data

This research has two objectives. For the first objective of this research project, the respondents (contractors' employees) were asked to investigate and document the knowledge of TQM contractors. The questionnaire was developed to elicit information about quality management practices in their businesses.

The second objective of this research project is to study the adoption and implementation of TQM in the construction industry is divided into five parts namely: contractors' perception of quality, the data acquisition methods used by them, the degree of training in TQM they provide to their employees, and the obstacles faced by them in implementing TQM in their businesses. The questionnaires were sent to 6 companies within Semarang City in Indonesia; with 30 questionnaires as a total (5 questionnaires for each company).

To complement the research objectives this research also study clients' satisfaction with the contractors' performance. A questionnaire specifically tailored for this purpose was also developed and given to several clients to get their feedback on the areas where they are dissatisfied/satisfied with the performance. This questionnaire was divided into four parts, namely: administrative, project management and engineering, construction and logistical process. Each process has several categories obtained from various technical papers, journals and existing projects. The clients were asked to identify the activities which they are most dissatisfied for each process. Their feedbacks were reviewed to identify the major areas of client dissatisfaction.

### 3.4 Data Analysis

Raw data collected were first sorted, edited, coded and then entered into a computer spreadsheet programs. For the qualitative analysis the study used Microsoft Excel (spreadsheet).

Two methods were used for analysing the data in general. For the first analysis, the data collected from respondents were analyzed according to the the contractors where they worked, while for the second method of data analysis, the data were analyzed according to the responses of respondents taken part in this research, irrespective of their companies. The first method of analysis was meant to provide the general response which can be used to represent the position of the respective contractors on the particular issues asked in the questionnaire. This analysis per contractor was conducted to get a better view of the TQM implementation in each of the contractor surveyed in this study. The data used to represent the results for TQM implementation within each company was based on the majority answers given by the respondents of that particular company. On the other had, the second method of data analysis was conducted to gauge the condition of all the contractors in general. This is important so that the issues of TQM implementation for the entire

construction industry in Semarang can be analyzed. By having these two methods a comparison between TQM implementation in the individual companies can be compared with the TQM implementation by the entire construction industry in general in Semarang.

Microsoft Excel program was used to make the many graphs containing the data obtained from respondents (the contractors' employee). The views from these individual employees working for the contractors are important because they are an integral part of these compamies, without whom the contractors cannot apply TQM successfully.

In analyzing the respondents' answer several methods were employed. For most questions on the knowledge and implementation of TQM the data analysis was based on the average responses from the respondents. For the sub section 4.6.4, 4.11.1, 4.11.2, 4.11.3 and 4.11.4 statistic method was used to analysis data. One question in the questionnaire also required a different analysis using the method of criteria. For this kind of analysis respondents were required to give points (2, 4, 6, 8 and 10) on the criteria they choose (sub section 4.6.5). This method was used so that a measurement to analyze the results can be obtained.

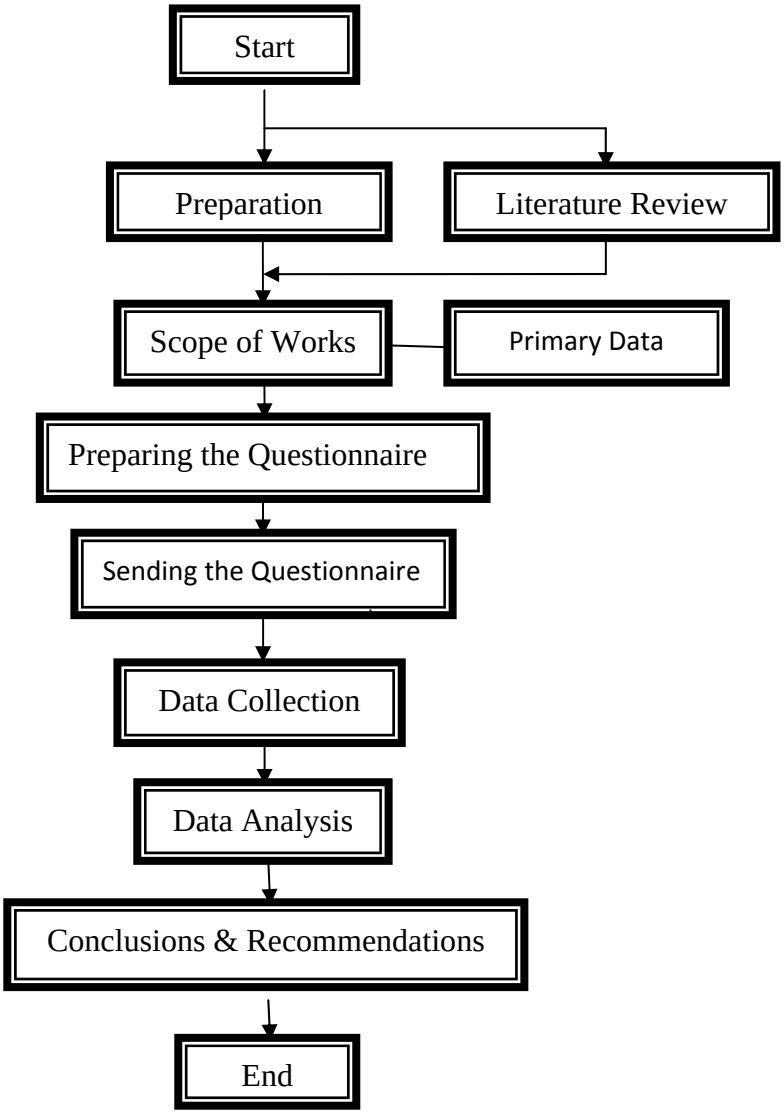



**Figure 3.1** The Structure of Flowchart

# CHAPTER IV
# RESULTS

## 4.1 Questionnaire

The previous chapter discusses the methodology implemented to conduct this research project. This chapter will analyze the results of the first questionnaire dealing with the knowledge of TQM within the contractors in Semarang**.**

## 4.2 The Respondents Profile

### 4.2.1 Response Rate

The questionnaires were sent to 6 companies in Semarang. Each company was given 5 questionnaires, hence a total 30 responses was expected. However, two questionnaires were not returned, thus this research analyzes the data from 28 returned questionnaires. The table below shows the response rate in data collection for this research.

**Table 4.1** Data collection response rate

| Companies | Number of questionnaire sent | Number of questionnaire returned | Response rate (%) |
|---|---|---|---|
| Waskita Karya | 5 | 4 | 80 |
| Pembangunan Perumahan | 5 | 5 | 100 |
| Wijaya Kusuma | 5 | 5 | 100 |
| Wijaya Karya | 5 | 4 | 80 |
| Hutama Karya | 5 | 5 | 100 |
| Adhi Karya | 5 | 5 | 100 |
| Total | 30 | 28 | 93 |

### 4.2.2 The Positions of Respondents in Their Companies

This information is related with the number of respondents for each position in the company. Waskita Karya had two engineering manager and three engineering staff as respondents in this study. In Wijaya Karya the respondents were two health/safety environment manager, one HSE engineer and one commercial manager. The respondents

In Wijaya Kusuma were one project manager, one site manager and three civil supervisors. The five respondents in Adhi Karya held the position as engineering manager, mechanical electrical, quality survey, quality control and other. In Pembangunan Perumahan the respondents were engineering staff, site manager, supervisor intendent, electrical manager and quality survey respectively. Finally for Hutama Karya the respondents were three site managers and two project managers.

As can be seen from the figure below, the respondents held different positions in their respective companies. The position with the largest respondents was manager (36%), supervisors, administration staff and others (with 14% respectively), followed by engineers (11%) and quality survey (8%). The position with the fewest respondents in this survey was quality control only 4% respondents occupying this position.

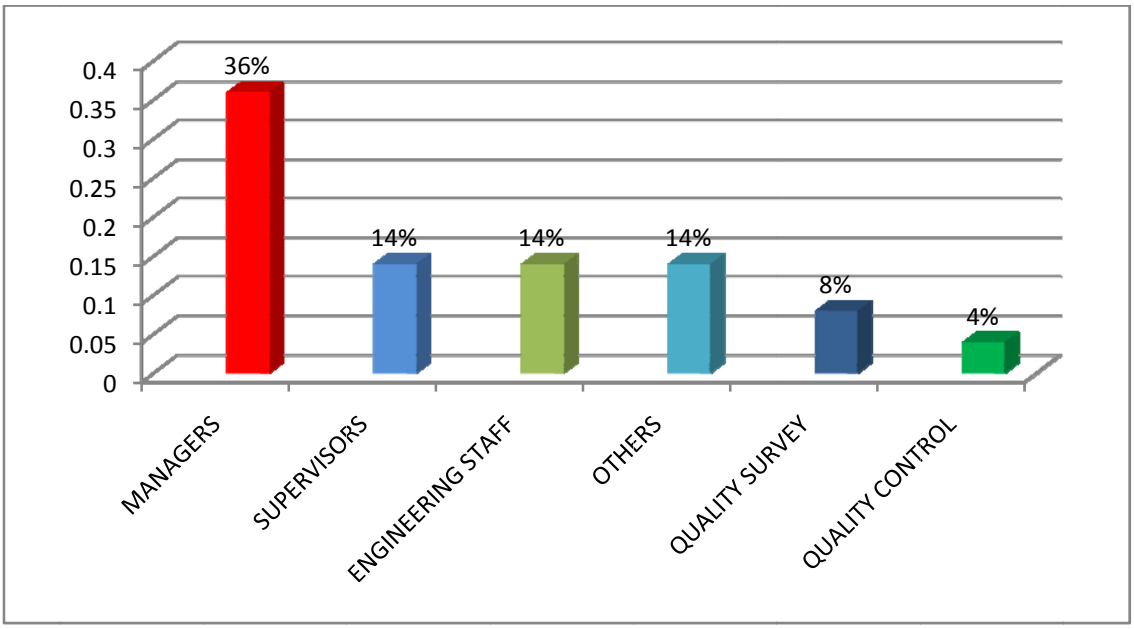



**Figure 4.1** The positions of respondents in their companies

### 4.2.3 Respondent's Years of Experience in Projects

For the years of experience, most of the respondents had only less than five years of working experience in projects (55%). 37% respondents had between five and ten years of experience in this field, while the smallest group in this category was those with experience of more than ten years at 8% level only.

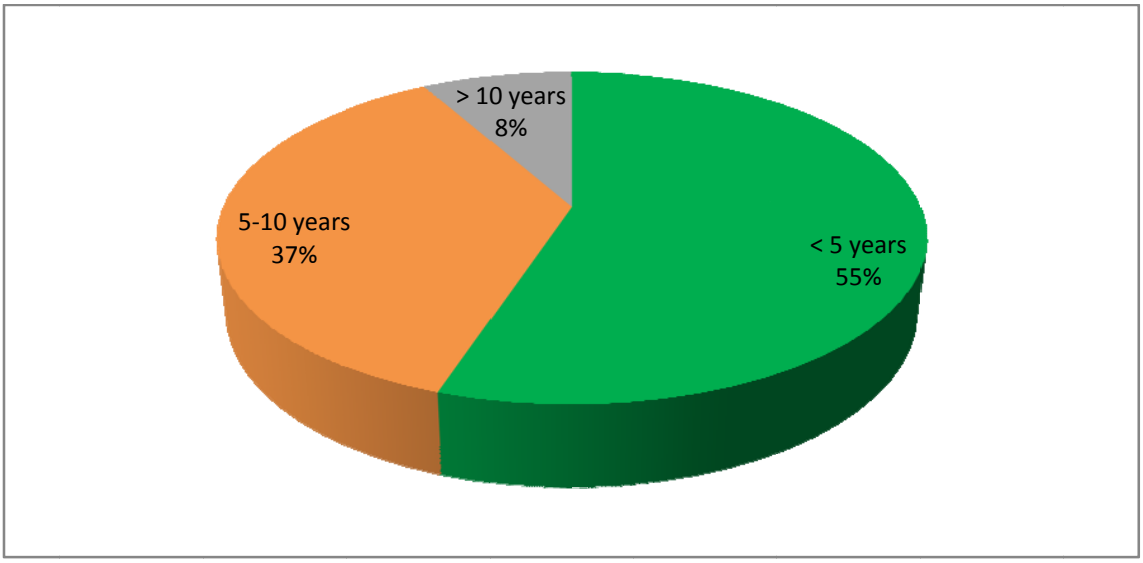



**Figure 4.2** Respondents years of experience in projects

### 4.3 The Years in Operation of the Six Contractors

Figure 4.3 below shows the number of years that the six contractors presented in this research have been operating.

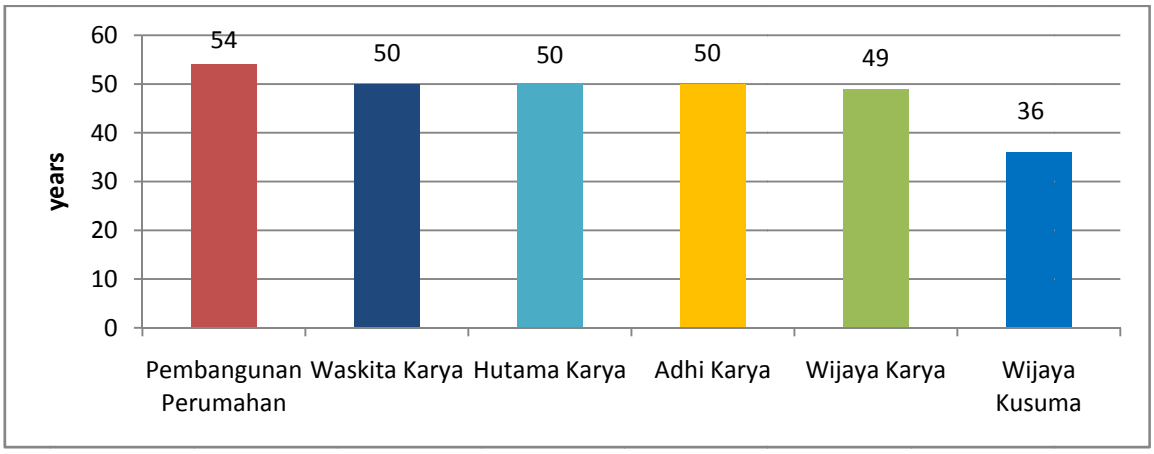



**Figure 4.3** Years in operation of the six contractors

As can be seen in figure 4.3 all contractors surveyed in this study have had many years in operation. The contractor with the longest record of operation is Pembangunan Perumahan, with 54 years of experience, while the contractor with least experience is Wijaya Kusuma, with 36 years of operational record in its organization.

### 4.4 Analysis of Questionnaire Result

The following tables are the results gathered from the questionnaire on the adoption and implementation of TQM by the contractors. The questionnaire consists of 34 questions and is divided in six sections as follows:

- Knowledge of TQM
- Perception of quality
- Data acquisition method
- Quality in organization
- Training
- Others

In most of cases the numbers used in these tables represent the number of contractors who gave response to the questions, while in other cases they represent the average and percentage**.**

### 4.5 Contractors Knowledge of TQM

In this section, five questions were asked to evaluate the knowledge of the contractors about TQM. The results are as follows:

#### 4.5.1 Definition of Quality

The respondents were asked about the most important measure best used to define quality in their organization. The general results representing the respective companies are shown in the table below.

**Table 4.2** Definition of quality for the respective contractors

| Companies | Measure to define quality |
|---|---|
| Waskita Karya | Team work |
| Pembangunan Perumahan | Team work |
| Wijaya Kusuma | Customer satisfaction |
| Wijaya Karya | Expenses |
| Hutama Karya | Customer satisfaction |
| Adhi Karya | Customer satisfaction |

The results in general show that three contractors put customer satisfaction as the best measure to define quality; two contractors chose team work, while one company thought expenses as the most important measure. It can be drawn from these results that most contractors consider customer's satisfaction as the best measure to define quality.

Any company needs to fulfill costumers's needs by providing the best services and products for them. In the construction industry giving the best service for the customers means providing good facilities that is satisfactory to the customers since they are the final users of the facility built by the contractor. If customers are satisfied with the services provided, they are more likely to give recommendations to other people to use the service of the contractor. They are more likely also to use the same contractor again in the future.

Thus the company should look for enough information that can be used in their decision making and change the business conducts in order to satisfy each of their customers. Also, by focusing on customer satisfaction the contractors can get a good feedback and further evaluation to ensure that they are providing the quality of service that their customers expect them to provide.

### 4.5.2 How TQM Works in the Organization

The questionnaire asks respondents to choose from four criteria on how TQM works in their respective organization. The general results representing the respective companies are shown in the table below.

**Table 4.3** How TQM work in the organization for the respective contractors

| Companies | How TQM work in the organization |
|---|---|
| Waskita Karya | To some extent. |
| Pembangunan Perumahan | Very well |
| Wijaya Kusuma | Very well |
| Wijaya Karya | To some extent. |
| Hutama Karya | To some extent. |
| Adhi Karya | Very well |

The results in general show that three contractors said that TQM works very well in their organization, while the other three contractors said that TQM works only to some

extent. All companies in this survey thought positively on how TQM works in their respective organization. They see that TQM implementation provide benefits in acheiving objectives, helping on promoting teamwork, competing and improving the communication throughout the organization.

The companies saying that TQM works very well in their organization see that TQM implementation has given these companies a lot of profits and lead to good productivity that help the staff improve quality. Other companies, however, think that TQM only works to some extent. In their case TQM works only in some particular area i.e., in improving the processes (the system) that create products or services to a point that they are error free and yield minimal scrap or waste of resources; or in putting quality control and quality assurance back in the line by empowering front line managers and workers, as it would really help the contructor for the project and increase the productivity of the company.

### 4.5.3 Benefit of TQM Progam

Respondents were asked whether TQM program brings benefit to their respective organizations. The general results representing the respective companies are shown in the table below.

**Table 4.4** Benefit of TQM program for the respective contractors

| Companies | Does TQM benefit organization? |
|---|---|
| Waskita Karya | Yes, because it improves customers satisfaction |
| Pembangunan Perumahon | Yes, because TQM assures quality and product result. |
| Wijay Kusuma | TQM program is beneficial to organization |
| Wijay Karya | TQM program is beneficial organization |
| Hutama Karya | Yes, because it can make employees more productive. |
| Adhi Karya | Yes, TQM program is beneficial in organization |

The results in general show that all contractors in this research agree that TQM is beneficial to their respective organizations. The majority mentions that TQM helps them well organize the projects they have. In other case, TQM helps in making great program for customer's satisfaction. TQM also makes any work easy and improve communication between workers. TQM enables these contractors improve their quality in their projects.

Other benefits include the improvement in employee's job satisfation and productivity as well as the increase in profits

### 4.5.4 Area in which TQM is Used to Improve

Respondents were asked to choose the area in their operation which can be improved using TQM. The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the area in which TQM is used in their companies.

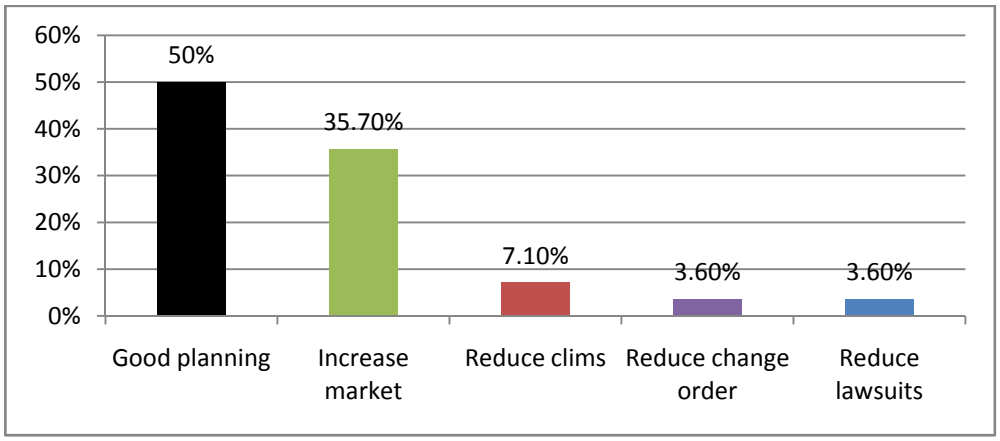



**Figure 4.4** Areas in which TQM program is used in the construction industry in Semarang.

The results obtained from respondents show that most of them (50%) said that TQM program is used to improve good planning in their companies. 35.7% said to increase market share, 7.1% to reduce claims and only 3.6% respondents said that the TQM program is used to reduce lawsuits and change order respectively.

### 4.5.5 Awareness of Industry Program to Implement the TQM or the ISO 9000 Standard

Respondents were asked whether they are aware of the TQM program implementation or the ISO 9000 standard in their companies. The general results representing the respective companies are shown in the table below.

**Table 4.5** Awareness of TQM or ISO 9000 implementation for the respective contractors

| Companies | Awareness of TQM or ISO 9000 implementation |
|---|---|
| Waskita Karya | The staffs are aware of TQM or ISO 9000. As the industry becomes more competitive, quality is very important for any company. |
| Pembangunan Perumahan | Most respondents are aware of TQM and ISO 9000 program as the company itself has got certification. |
| Wijaya Kusuma | All respondents are aware of TQM and ISO 9000 program. The company is also certified with ISO 2001 |
| Wijaya Karya | All respondents are aware of TQM and ISO 9000 program used to improve quality. |
| Hutama Karya | Most respondents are aware of TQM and ISO 9000 program. |
| Adhi Karya | Most respondents are aware of TQM and ISO 9000 program. |

The results in general show that the big majority of respondents working in the contractors in this research are aware of the program in their industry to implement TQM and the ISO 9000. One contractor even have gone a step further with ISO 2001 certification. This results show that all companies agree that if they satisfy their customers, the profits will increase in long run.

The contractors have a view that TQM will improve costs and estimating and warranty clients. They understand the potential benefits in implementing TQM or ISO 9000. As the construction industry has become more and more competitive and customers are hard to get, the quality is very important for any company. Most contractors also think that both TQM and ISO 9000 are neccessary to use in their respective organizations because they put the standard for these organization to become world class.

ISO standard is seen as superior between the two as it offers a set of guidliness for quality management, whereas TQM is mostly used to continue improvement processes, identifying the causes of quality problems and in elliminating them. With implementation of both TQM and ISO in the organization it is hoped that all quality problems can be solved.

### 4.6 Contractor's Perception of Quality

In this section, six questions were asked to evaluate the contractors's perceptions of quality. Results are as follows.

#### 4.6.1 Organization's Perception of Quality

Respondents were asked to choose one answer about their respective organization's perception of quality. The general results representing the respective companies are shown in the table below.

**Table 4.6** Organization's perception of quality for the respective contractors

| Companies | Organization's perception of quality |
|---|---|
| Waskita Karya | A competitive advantage |
| Pembangunan Perumahan | A competitive advantage. The more competitive, the better |
| Wijaya Kusuma | A competitive advantage |
| Wijaya Karya | A competitive advantage |
| Hutama Karya | A competitive advantage. With this advantage in quality the company can get better profit for giving customers the best service and product. |
| Adhi Karya | A competitive advantage |

The results in general show that all contractors view a competitive advantage over the competitors as their respective organization's perception of quality because of the role of competitive advantage in representing good quality, strenght, resistance and safety. The Total Quality Management (TQM) philosophy of doing business emphasizes lowering costs by reducing waste, helping suppliers provide quality products and satisfying the customer with quality goods and services. Contractors that can produce goods at lower costs than their competitors, while delivering quality products that satisfy their customers, will have an advantage over those companies that do not duplicate those feats. Implementing TQM can help a company gain a competitive advantage in their business. Implementing TQM can help a company gain a competitive advantage in their business. Competitive advantages can make the company that have them a pioneer and leader in the industry. These in turn will enable the company to an increase in productivity which eventually lead to increasing profits.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the organization's perception of quality.

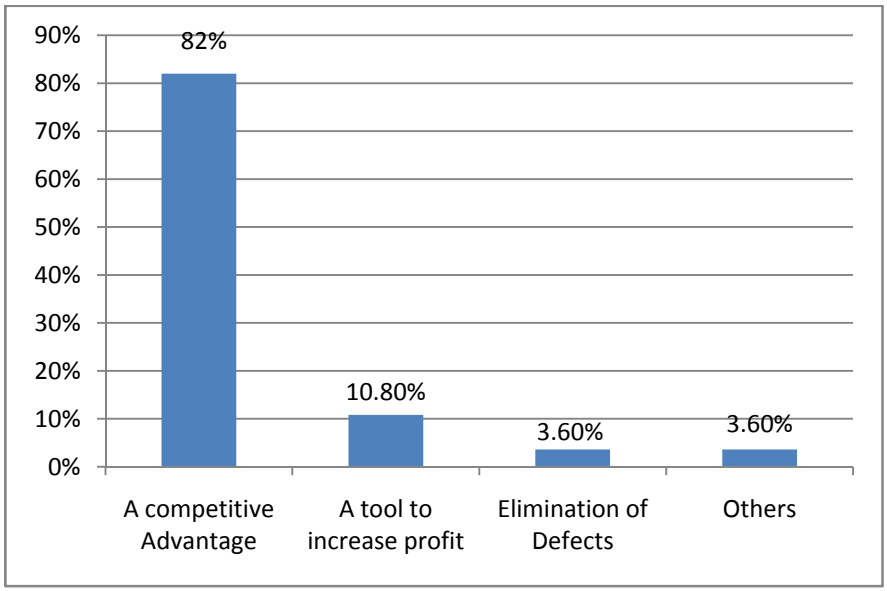



**Figure 4.5** Organization's perception of quality in the construction industry in Semarang.

The figure above shows that the big majority of respondents taking part in this research (82%) viewed a competitive advantage as their organization's perception of quality, while elimination of defects and others had the lowest rate of perception with only 3.6% respondents viewed them as the criterion for quality respectively.

### 4.6.2 The Rate of Importance for Product and Service Quality

Respondents were asked to rate the importance of product/service quality. The general results representing the respective companies are shown in the table below.

**Table 4.7** The rate of importance of product/service quality for the respective contractors

| Companies | Quality of product/service's rate of importance |
|---|---|
| Waskita Karya | Important, because the quality of product can get customers trust and make the company more competitive |
| Pembangunan Perumahan | Very important because good quality will increase customer satisfaction and make the company get recognition. |
| Wijaya Kusuma | The quality of product/service is important |

| Companies | Quality of product/service's rate of importance |
|---|---|
| Wijaya Karya | The quality of product/service is very important for company to improve profits |
| Hutama Karya | Very important, because customer satisfaction depends on the product's quality |
| Adhi Karya | The quality of product/service is very important |

The results in general show that most contractors say that the quality of product/service is 'very important', with only two contractors rate the quality of product/service as 'important' only. Most contractors view the quality of product/service they provide as 'very important' because they realize that the satisfaction of their customers depend on the quality of products/services they deliver. If a contractors can provide high quality services for its customers, they will trust the company and use its service again in the future. Thus more potential profits for the company. To ensure quality managers need a set of practical step-by-step tools and methods which ensure a better understanding of customers' needs and requirements, as well as procedures and processes, to enhance communication by focusing on the voice of the customer within a product development project.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the rate of importance for product/service quality.

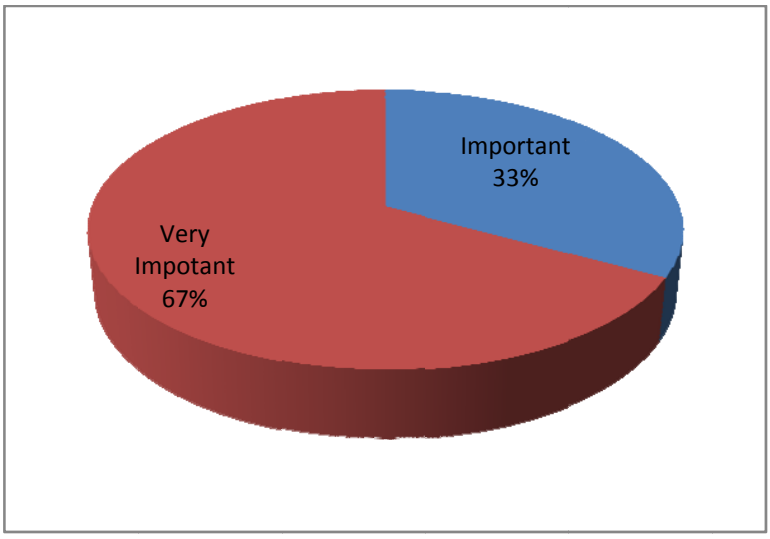



**Figure 4.6** The rate of importance for product/service quality in the construction industry in Semarang.

Two third (67%) of respondents rated the quality of product/service as ‘very important’. The other 33% respondents rated the quality of product/service only as ‘important’.

### 4.6.3 The Customer Satisfaction’s Rate of importance

Respondents were asked to rate the importance of customer satisfaction for their organization. The general results representing the respective companies are shown in the table below.

**Table 4.8** The rating of customer satisfaction for the respective contractors

| Companies | Customer satisfaction rating |
|---|---|
| Waskita Karya | Very important, because any company research about satisfaction customer through continuous improve product and service for good quality |
| Pembangunan Perumahan | Very important, because customer satisfaction is one of the company’s success parameter, as the company become more famous and trusted. |
| Wijaya Kusuma | Very important, as it can make the company become pioneer in the market. |
| Wijaya Karya | Customer satisfaction is very important for the company |
| Hutama Karya | Very important, because the final objective of the company is satisfied customer. |
| Adhi Karya | Customer satisfaction is very important for the company |

The results in general show that all of the contractors in this research rate customer satisfaction as very important. It is because they view that by delivering customer satisfaction the company can be make more successe for product, service and good quality, morever the satisfation from employees is similar to the distrubution products, the final good products is satisfafction customer.

### 4.6.4 Process Improvement Potential Rating

Respondents were asked to rate the improvement potential of nine processes in their company's operations. The respondents can give from 5 point for the process with very low potential to 1 point for the process with the highest potential for improvement in their respective organizations. The average results for each process irrespective of the companies are shown in the figure below.

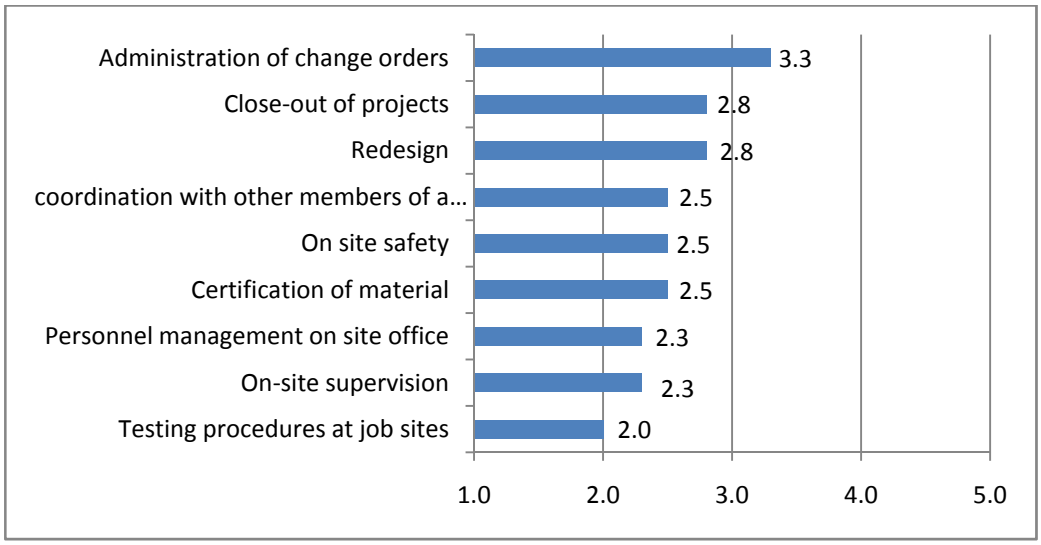



**Figure 4.7** The potential for process improvement in the construction industry in Semarang.

The results as shown in the figure above show that according to respondents of this research, the process with the highest rate of improvement potential is the testing procedures at job sites with the average point of 2.0. On the other hand the process with.the lowest potential for improvement in their organization is the administration of change orders process, with the average point of 3.3.

### 4.6.5 The Operational Variable Ranking in order of Importance

Respondents were asked to rank the five operational variables in their respective organizations according to their importance. The variable with the highest importance gets 10 points, the second one gets 8 points, the third one 6 points, the fourth 4 points and the fifth (least important among other variables) gets only two points. Results were then added up according to the respective companies. The table below shows the collective ranking of these variables among the contractors surveyed in this research.

**Table 4.9** Collective variable ranking in order of importance

| Variable | Waskita Karya | Pembangunan Perumahan | Wijaya Kusuma | Wijaya Karya | Hutama Karya | Adhi Karya | Total | Rank |
|---|---|---|---|---|---|---|---|---|
| Scope | 28 | 32 | 22 | 34 | 32 | 48 | 196 | 1 |
| Quality | 20 | 28 | 44 | 36 | 34 | 28 | 190 | 2 |
| Cost | 30 | 34 | 26 | 20 | 40 | 36 | 186 | 3 |
| Safety | 28 | 44 | 34 | 18 | 26 | 24 | 174 | 4 |
| Time (schedule) | 10 | 12 | 24 | 12 | 18 | 14 | 90 | 5 |

As can be seen from the table above the contractors think ‘scope’ as the most important variable in their operation. Next in the order of importance are ‘quality’, ‘cost’ and ‘safety’, with ‘time (schedule)’ ranks at the bottom. These results show the priorities of the contractors in building their projects. Note that the contractors see ‘time (schedule)’ of the project as the least important variable compared against the other fours.

### 4.6.6 The Level of Quality Goals Benchmark

Respondents were asked to benchmark the quality goals set by their companies. The general result for the respective contractors is shown below.

**Table 4.10** Quality goals benchmark for the respective contractors

| Companies | Benchmark |
|---|---|
| Waskita Karya | The leading company in the field set the benchmark for the company |
| Pembangunan Perumahan | The leading company in the field set the benchmark for the company because it can better the company |
| Wijaya Kusuma | The competition in general set the benchmark |
| Wijaya Karya | The competition in general set the benchmark |
| Hutama Karya | The leading company in the field set the benchmark for the company. |

| Companies | Benchmark |
|---|---|
| Adhi Karya | The leading company in the field set the benchmark for the company |

The results in general show that the majority of the companies are setting their quality goals to the level of the leading company in the field, while some only set their quality goals to the level of the competition in general. The leading company in the field is successful in the business because it has high quality standard. Thus the majority of contractors want to emulate this success by setting their quality goals accordingly. By doing so it is hoped that they can also stand out among the competition and earn the trust from customers. This is important because most of these contractors are seeking to grow and develop their companies further in the future.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the quality goals benchmark.

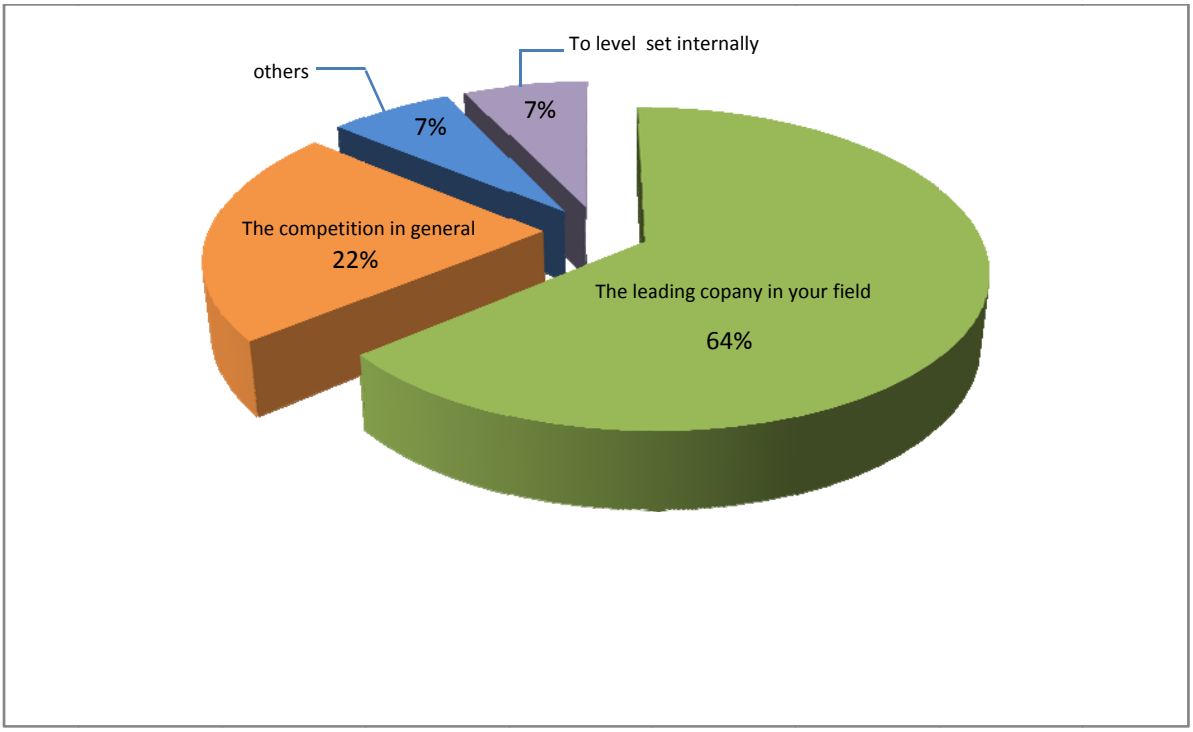



**Figure 4.8** Quality goal benchmark in the construction industry in Semarang.

The figure above shows that most respondents (64%) said that their respective companies use ‘the leading company in the field’ as the benchmark for their quality goals. 22 % said they use ‘the competition in general’ as benchmark, and only 7% chose either ‘a level set internally’ or ‘others’ as quality goals benchmark respectively.

### 4.7 The Contractors Data Acquisition Method

In this section seven questions were asked to know how these contractors gather information. Results are as follows.

#### 4.7.1 Collection of Data to Measure Operational Performance

Respondents were asked whether their company collects data to measure operational performance. Results for the respective companies are shown below.

**Table 4.11** Collection of data to measure operational performance for the respective contractors

| Companies | Collection of data to measure operational performance |
|---|---|
| Waskita Karya | Can not say. Sometimes they collect, sometimes not |
| Pembangunan Perumahan | Yes. |
| Wijaya Kusuma | Yes. |
| Wijaya Karya | Yes. |
| Hutama Karya | Yes. They also make regular weekly report |
| Adhi Karya | Yes. |

The results in general show that almost all contractors collect the data to measure their operational performance. They view this data collection as the best instrument to measure the quality of their works. By collecting data it is hoped that they can quickly recognaize the problems they are facing. Thus the contractors can continuously maintain or even improve quality. In general data are collected by the employees every six months though some also have regular weekly report. The data contain all necessary information required by the companies to be competitive and succesful.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the collection of data by the contractors to measure operational performance.

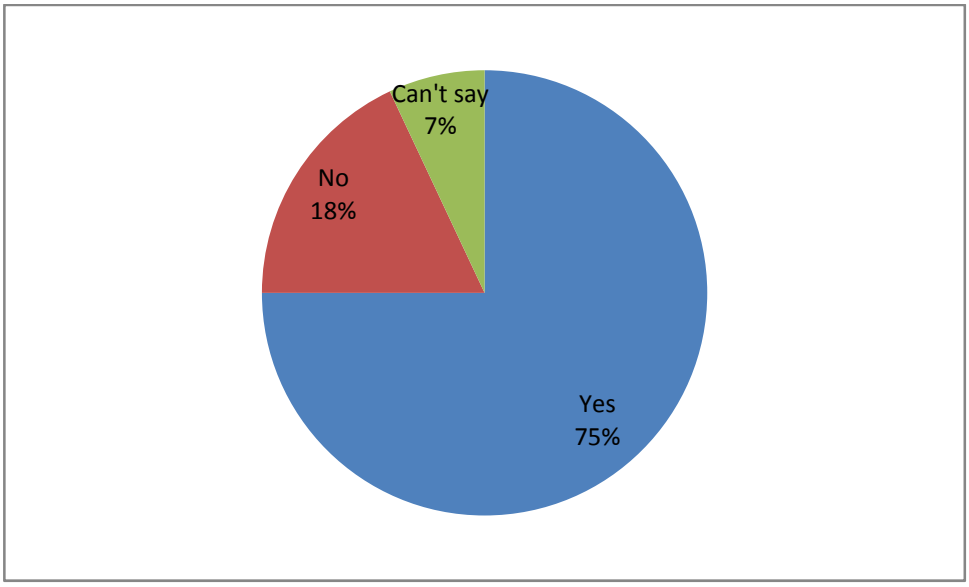



**Figure 4.9** Collection of data to measure operational performance in the construction industry in Semarang.

The figure above shows that most respondents (75%) said that their company collects data to measure operational performance. However, 18% of the respondents said their company do not collect the data, while a further 7% cannot even say whether their company collects data or not.

### 4.7.2 How the Organization Solves Problems

Respondents were asked on how problems are solved in their organization. Results for the respective companies are shown in the table below.

**Table 4.12** The method to solve problems for the respective contractors

| Companies | How the organization solves problems |
|---|---|
| Waskita Karya | Set up a multi-disciplinary team for each problem. Problems should be managed at every level and people coordinated to find solution for it. |
| Pembangunan Perumahan | Set up a multi-disciplinary team for each problem in the organization |
| Wijaya Kusuma | A permanent team is available in the organization to solve the problems |
| Wijaya Karya | A permanent team is available in the organization to solve the |

| Companies | How the organization solves problems |
|---|---|
| | problems |
| Hutama Karya | Set up a multi-disciplinary team for each problem which include management participation in solving that problems |
| Adhi Karya | A permanent team is available in the organization to solve the problems |

The results in general show that half of the companies in this research solve their problems by setting up a multi-disciplinary team for each problem, while the other half say that they have a permanent team available in the organization to solve the problems. The important thing is that the companies should have a team which coordinate and manage all the problems arising in their work which can have negative impact on the progress of the project. The contractors should also apply GCG value in their organization to enhance transparency, accountability and fairness to increase team competance and coordination. Regular weekly meeting and monthly management review should also on the management's agenda in solving problems.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with how the organization solves problems.

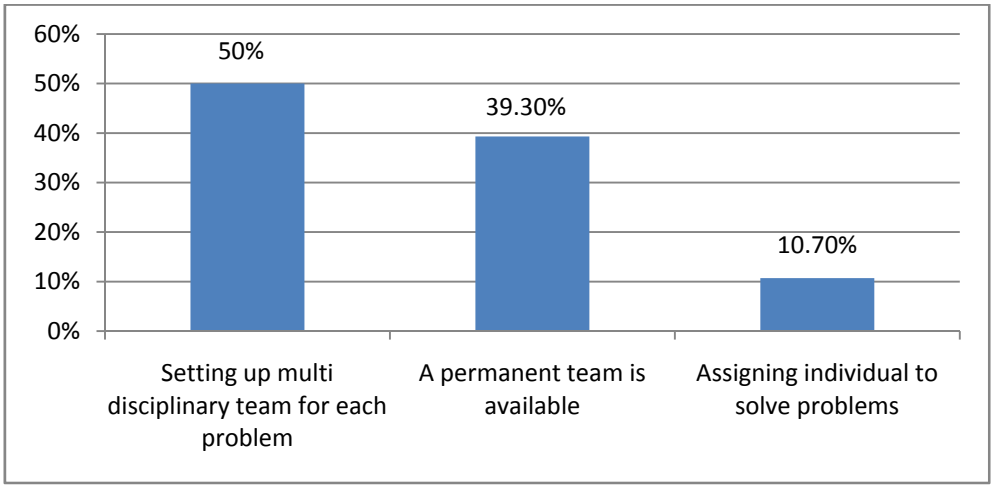



**Figure 4.10** How the organization solves problems in the construction industry in Semarang.

The figure above shows that 50% of the respondents said that their organization solves the problem by setting up multi disciplinary team for each problem. Another 39.3% said that a permanent team is available in their organization to solve the problems, while a further 10.7% said their company assigns individual to solve problems

### 4.7.3 System for Gathering Customer Suggestion

Respondents were asked whether their organization has a system to gather customer suggestion. Results for the respective companies are shown in the table below.

**Table 4.13** The system for gathering customer suggestion for the respective contractors

| Companies | Is there a system to gather customer's suggestion? |
|---|---|
| Waskita Karya | Yes, because advises from customer are very important for the company |
| Pembangunan Perumahan | Yes, the company has a set system for gathering customer suggestion |
| Wijaya Kusuma | Yes, the company has a set system for gathering customer suggestion |
| Wijaya Karya | Yes, the company has a set system for gathering customer suggestion |
| Hutama Karya | Yes. The company also uses customer suggestion in the review of its performance in every week |
| Adhi Karya | Yes, the company has a set system for gathering customer suggestion |

In general all companies have a set of system to gather customer suggestion. It is because advices from customer are very important for them all. Most contractors seek information from their customers to improve processes and obtain customer satisfaction. One company also uses this customer feedback in its weekly performance review.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the existence of a system to gather customer suggestion.

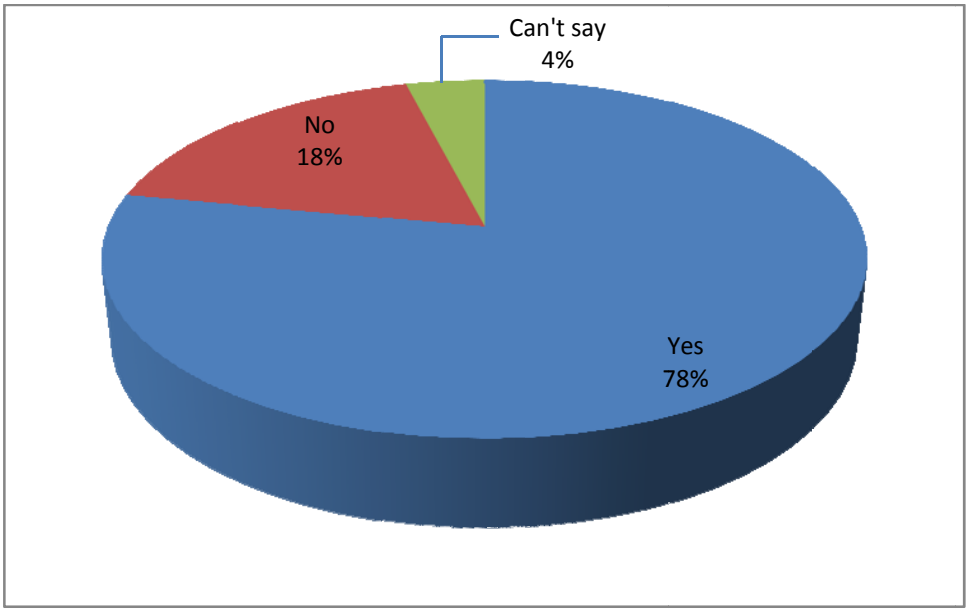



**Figure 4.11** Existence of a set system for gathering customer suggestion in the construction industry in Semarang.

The majority of respondents (78%0 said that their organization has a set of system for gathering customer suggestion. 18% said they do not have such a system, while the other 4% cannot say whether their company has the system or not.

### 4.7. 4 How to Measure Customers Satisfaction

Respondents were asked on how their organization measures customer satisfaction. Results in general for the respective companies are shown in the table below.

**Table 4.14** Measurement of customer satisfaction for the respective contractors

| Companies | How contractors measures customer satisfaction |
|---|---|
| Waskita Karya | The company use questionnaire surveys to enable customers give many advises to improve customer satisfaction |
| Pembangunan Perumahan | The company uses other methods i.e., dealing directly with complain from customer, inputs from owner about the operation result and informal meeting. |
| Wijaya Kusuma | By questionnaire surveys |
| Wijaya Karya | By questionnaire surveys |
| Hutama Karya | By the number of complaints |
| Adhi Karya | By questionnaire surveys |

In general, most contractors measure customer satisfaction using the questionnaire surveys. The questionnaire survey is used because it can give the customers many advices to measure the company's performance and improve customer satisfaction. One contractor use other methods of measurement by dealing directly with complain from customer, using the inputs from the owner about their operational result and arranging informal meeting. Another company sees the number of complaints as its tool to measure customer satisfaction.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with how the contractors measure customer satisfaction.

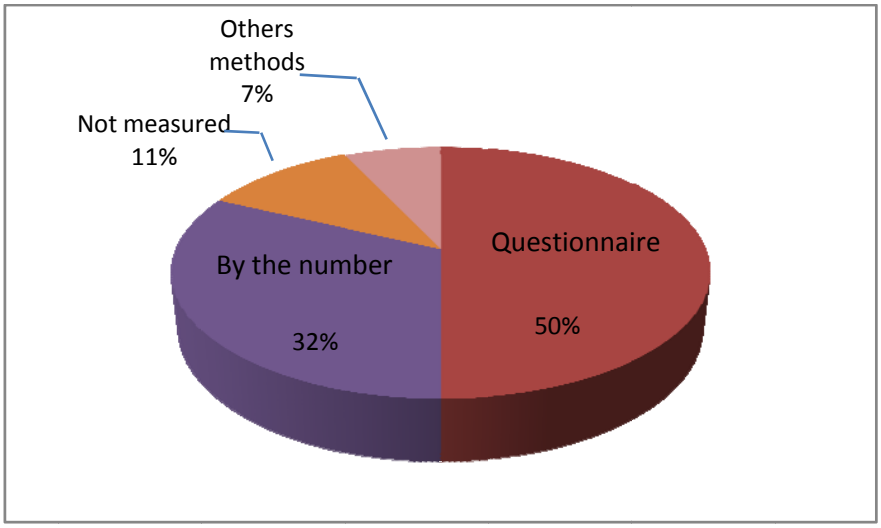



**Figure 4.12** Measurement of customer satisfaction in the construction industry in Semarang.

Questionnaire survey was chosen by 50% of respondents as the tool to measure customer satisfaction in their company. Some 32% chose to measure it using the number of complains. 11% said their company does not measure it, while a further 7% chose other methods.

### 4.7.5 Employees Empowerment to Make Significant Changes in Operation

Respondents were asked whether the employees are empowered by the companies to make significant changes in operation. Results in general for the respective companies are shown in the table below.

**Table 4.15** Employee empowerment to make significant changes in operation for the respective contractors

| Companies | Employee empowerment |
|---|---|
| Waskita Karya | Only key personnel are empowered to make significant changes in operations |
| Pembangunan Perumahan | Employees are fully empowered to make significant changes in operations |
| Wijaya Kusuma | Only key personnel are empowered to make significant changes in operations |
| Wijaya Karya | Only key personnel are empowered to make significant changes in operations |
| Hutama Karya | Employees are fully empowered to make significant changes in operations |
| Adhi Karya | Only key personnel are empowered to make significant changes in operations |

The results in general show that the majority of contractors only empower key personnel in their organization to make significant changes in operations. While on one side this fact can be seen as a sign that the implementation of quality management system does not work well in the organization, it can also be seen as a way for the organization to allocate their resources on the select few thus everyone in the company can focus on their respective tasks. The other companies choose to fully empower their personnel to take significant changes in operations because they believe that everyone in the company has the ability, skill and creativity to make significant change provided they are given the right education/training.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with employee empowerment.

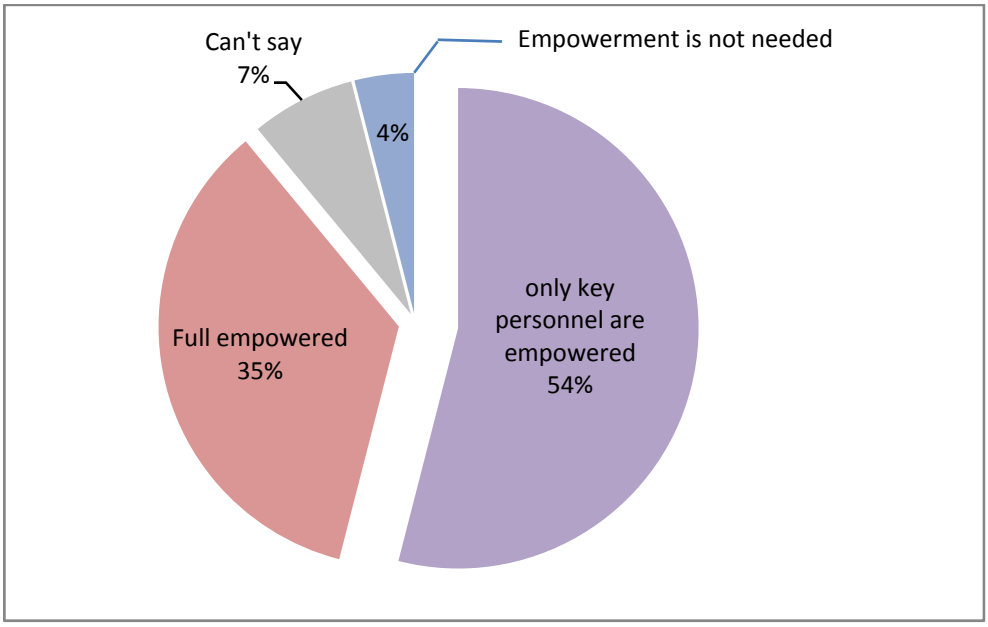



**Figure 4.13** Employee empowerment in the construction industry in Semarang.

Most respondents (54%) said that their company empowers the key personnel only to make any significant changes operation. Those who said the contractors fully empower their employees are 34% of total, 7% cannot say and the other 4% said that employee empowerment to make any significant changes operation in their organization is not needed.

### 4.7.6 Rated Suppliers/Subcontractors

Respondents were asked whether the suppliers/subcontractors of their companies are rated. Results in general for the respective companies are shown below.

**Table 4.16** Rated Suppliers/subcontractors for the respective contractors

| Companies | Are the suppliers/subcontractors rated? |
|---|---|
| Waskita Karya | Suppliers/subcontractor are rated to insure that they are professional and up to the standard. Things usually considered are capital, human resources and experience. |
| Pembangunan Perumahan | Suppliers/subcontractors are rated depending on their quality, manpower, health and safety record and cost |
| Wijaya Kusuma | Contractors are suppliers/subcontractors rated |

| Companies | Are the suppliers/subcontractors rated? |
|---|---|
| Wijaya Karya | Suppliers/subcontractors are rated on the basis of their performance |
| Hutama Karya | Suppliers/subcontractors are rated on the basis of their performance |
| Adhi Karya | Ssuppliers/subcontractors are rated |

The results in general show that all contractors require their suppliers/subcontractors to be rated as they want the best suppliers and subcontractors to get the best service/product. The companies need to be professional and up to the standard level. Moreover, there are three things usually considered from supplier and subcontractors, namely: the capital, human resouces and experience. The contractors also see the quality of manpower, health and safety records and costs of their suppliers/subcontractors. All these are necessary so that the contractors can provide the best products and services for customers.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with suppliers/subcontractors rating.

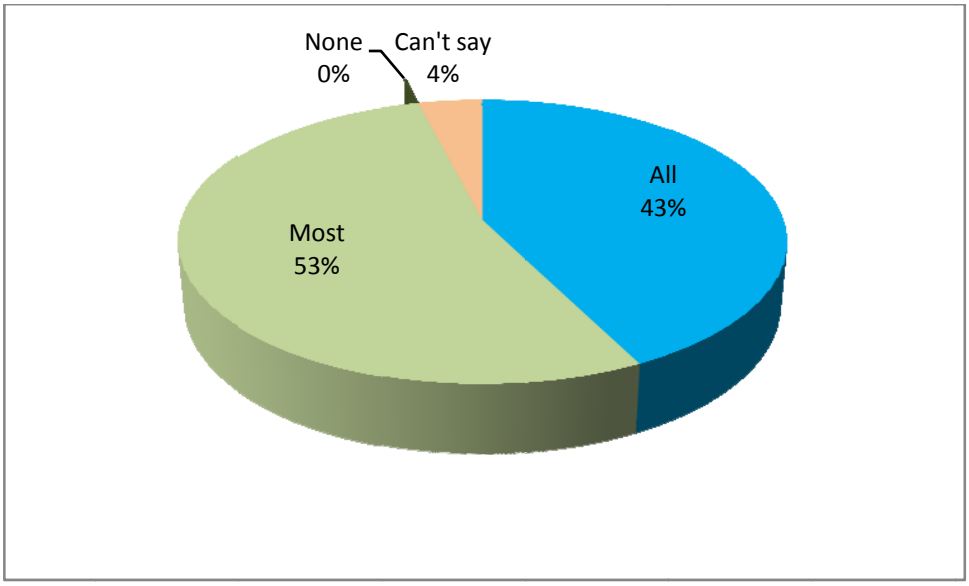



**Figure 4.14** Rated suppliers/subcontractors in the construction industry in Semarang.

It can be seen in this figure that most respondents (53%) said that most suppliers/subcontractors in their company are rated. 43% of them said that all suppliers/subcontractors in their company are rated, and only 4% cannot say.

### 4.7.7 Defects in Service and Subcontractors Obligation to Pay/Correct

Respondents were asked whether the subcontractors in their organization are obliged to pay or correct their mistake if defect occurs. Results in general for the respective companies are shown in the table below.

**Table 4.17** Subcontractors obligation to pay for/correct for defect for the respective contractors.

| Companies | Subcontractors' obligation |
|---|---|
| Waskita Karya | Each subcontractor is required to take responsibility when mistakes happen and pay for or correct them |
| Pembangunan Perumahan | If defects in service are identified, subcontractors are required to pay for or correct them |
| Wijaya Kusuma | If defects in service are identified, subcontractors are required to pay for or correct them |
| Wijaya Karya | If defects in service are identified, subcontractors are required to pay for or correct them |
| Hutama Karya | If defects in service are identified, subcontractors are required to pay for or correct them |
| Adhi Karya | If defects in service are identified, subcontractors are required to pay for or correct them |

The results in general show that all companies agree that if defects in services are identified subcontractors responsible for those defects are required to pay for or correct them. It is the responsibility of each subcontractor to correct defects and mistake in their work. The management of the contractors also put this into consideration when negotiating the contract's rules of engagement with their subcontractors to avoid dispute in the future.

In this sense, the subcontractors need to be very careful to avoid mistakes and shortcomings in their work and to provide the best service possible. In this way both the

contractors and subcontractors are benefitted. The subcontractors will not get a claim to pay for or correct defects, while the contractors can deliver high quality work to satisfy their customers,

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with suppliers/subcontractors obligation to pay for/correct defects.

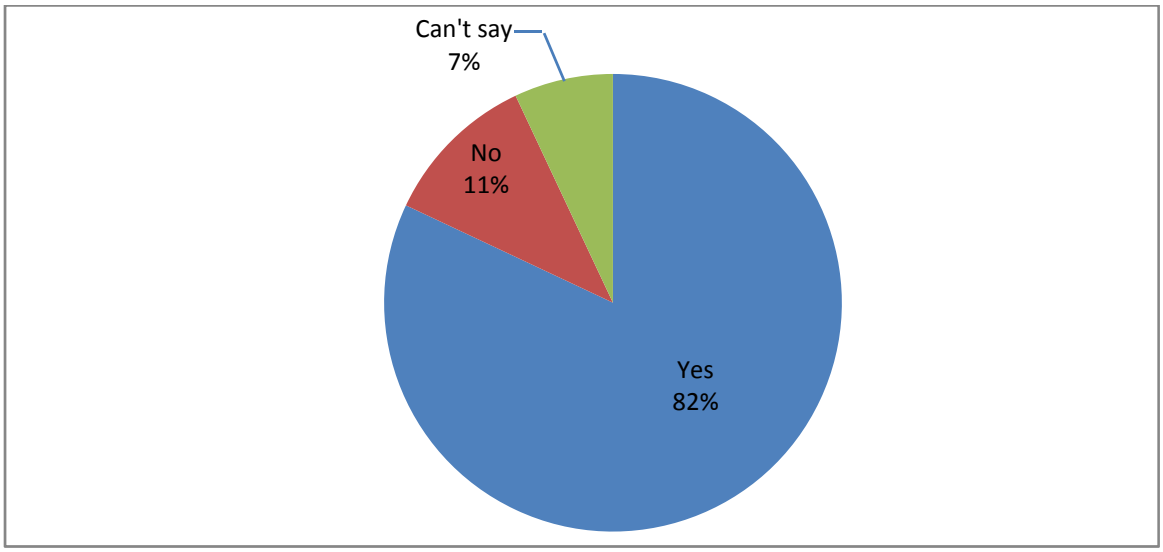



**Figure 4.15** subcontractors obligation to pay for/correct defects in the construction industry in Semarang.

The majority of respondents (82%) said that the subcontractor must pay for or correct defects of their service when they are identified. 11% of them said the subcontractors are not requred to pay for or correct them, while 7% cannot say.

### 4.8 Quality in their organization

In this section, contractors were asked 11 questions to find out about quality in their organizations. Results are as follows.

#### 4.8.1 The Organization's Clear Definition of Quality

Respondents were asked whether their organization has developed a clear definition of quality. The general results for the respective companies are shown in the table below.

**Table 4.18** The clear definition of quality for the respective contractors

| Companies | Has the organization developed a clear definition of quality? |
|---|---|
| Waskita Karya | Yes. The company also has slogan 'being better with better quality'. |
| Pembangunan Perumahan | Yes. The company even has quality satisfaction and environmental target assessment every month. |
| Wijaya Kusuma | Yes, the organization has developed a clear definition of quality |
| Wijaya Karya | Yes, the organization has developed a clear definition of quality |
| Hutama Karya | Yes, because building quality is important for the company |
| Adhi Karya | Yes, the organization has developed a clear definition of quality |

The general results show that all contractors have developed a clear definition of quality in their respective organizations. One contractor considers it necessary because they want their employee to understand that the quality of the buildings they make is very important for the company as it affects customer satisfaction. It is hoped that by having a clear definition of quality the companies can maintain or even improve their quality further with innovation so that they can be trusted by potential customers. Likewise, another contractor even have quality satisfaction and environment target assessment every month. That is to insure that the quality objectives are always met.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with whether the contractors have a clear definition of quality in their organization.

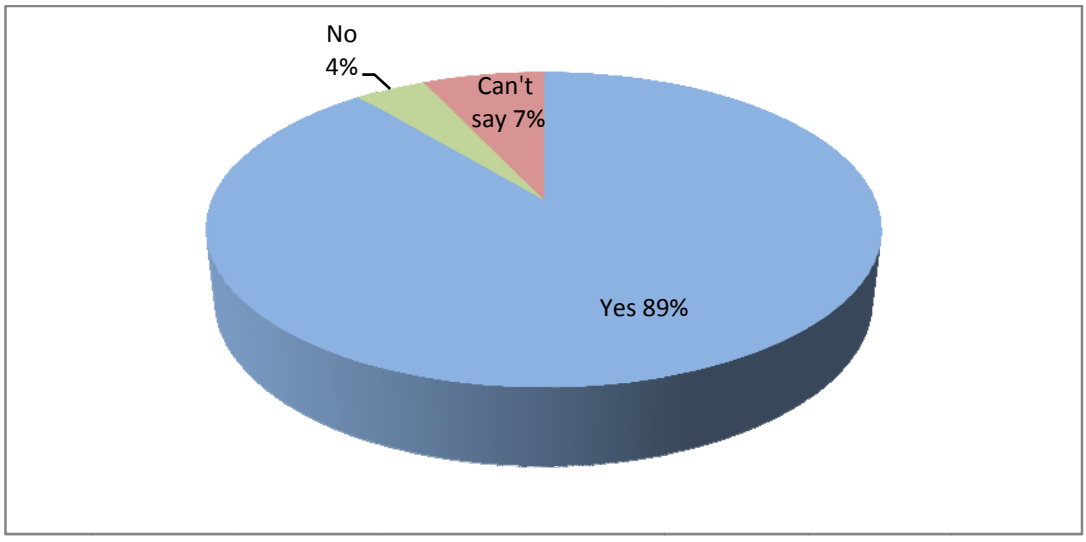



**Figure 4.16** Clear definition of quality in the construction industry in Semarang.

For this question the respondents were asked whether their company has developed a clear definitaion of quality in their organizations. Most respondents (89%) answered this in the affirmative as they see the quality of their work as vrey important. However, 4% of them confessed that their organization does not have such a clear definition of quality, while another 7% cannot say.

### 4.8.2 Percentage of Employees who are aware of the Importance of Quality.

Respondents were asked the percentage of employee in their organization who are aware of the importance of quality. The results in general for the respective companies are shown in the figure.

The figure below shows the average percentage of employees who are aware of the importance of quality within the respective companies.

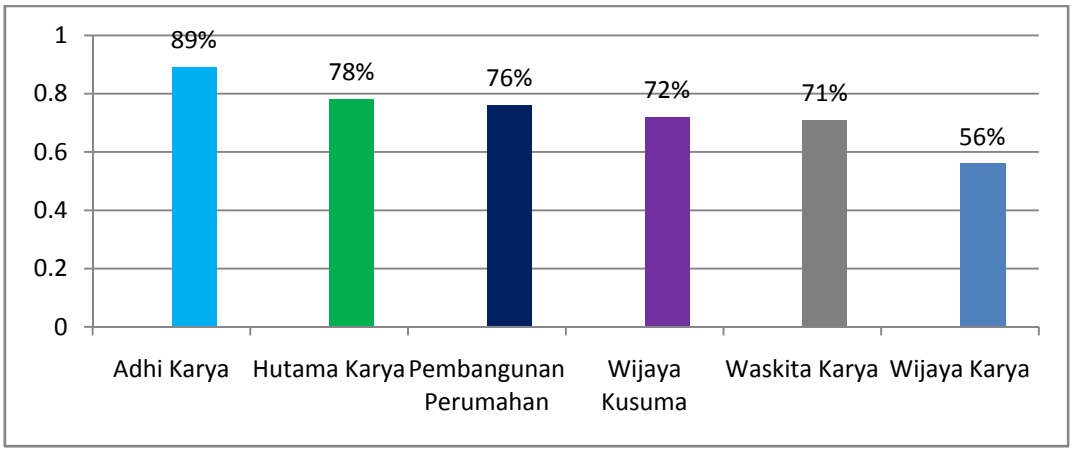



**Figure 4.17** Percentage of employees who are aware of the importance of quality.

The figure above shows that the highest rate of employee awareness on the importance quality is in Adhi Karya (89%). Hutama Karya, Pembangunan Perumahan, Wijaya Kusuma and Waskita Karya follow closely behind at a rate of 78%, 76%, 72% and 71% respectively. Wijaya Karya has the lowest rate with only 56% of their employees has the awareness on the importance of quality.

### 4.8.3 Quality Improvement Program within the Organization

Respondents were asked whether their company has a quality improvement program in the organization. The results in general for the respective companies are shown in the table below.

**Table 4.19** Existence of quality improvement program for the respective contractors

| Companies | Does the company have a quality improvement program? |
|---|---|
| Waskita Karya | A quality improvement plan has been a part of corporate policy for some time now. |
| Pembangunan Perumahan | A quality improvement plan has been a part of corporate policy for some time now. |
| Wijaya Kusuma | A quality improvement plan has been a part of corporate policy for some time now. |
| Wijaya Karya | A quality improvement plan has been a part of corporate policy for some time now |
| Hutama Karya | A quality improvement plan has been a part of corporate policy for some time now. |
| Adhi Karya | A quality improvement plan has been a part of corporate policy for some time now |

The results in general show that all companies have had a quality improvement plan as part of their corporate policy for some time now. Sharing and updating knowledge among the employees to know better method are encouraged. These companies also measure their own standard of project quality against the quality of their competitors. Some contractors think that this program helps their organization in maintaining and even improving good quality management. In every division project execution and innovation are assessed every month for consistency and to better quality. All these have been put in their standard operating procedurce.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with whether the organization they work in has a quality improvement program.

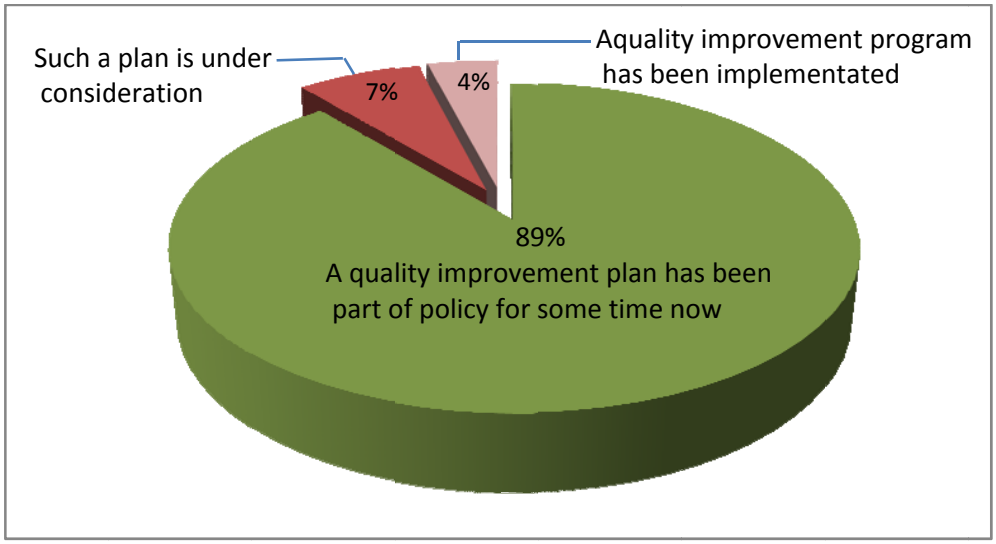



**Figure 4.18** Existence of quality improvement program in the construction industry in Semarang.

Note that most of the respondents (89%) said that a quality improvement program has been a part of the policy in their organization for some time now. 7% of them, however, said that such a plan is only still under consideration, while another 4% respondents said that a quality improvement program has only been recently implemented in their organization.

### 4.8.4 The Type of Program Used by Contractors to Improve Quality

Respondents were asked about the type of the program used in their company to improve quality. Results in general for the respective companies are shown in the table below.

**Table 4.20** The type of program used to improve quality for the respective contractors

| Companies | Type of program |
|---|---|
| Waskita Karya | ISO 9000 and quality control/quality assurance to monitor the quality in the company. |
| Pembangunan Perumahan | ISO 9000 and Quality control/Quality Assurance |
| Wijaya Kusuma | ISO 9000 for quality improvement program |
| Wijaya Karya | ISO 9000 for quality improvement program |

| Companies | Type of program |
|---|---|
| Hutama Karya | Using more than one program i.e., ISO 9000 and Quality control/Quality Assurance |
| Adhi Karya | ISO 9000 for quality improvement program |

The results in general show that all contractors use ISO 9000 as their program to improve quality. Some even go one step further by implementing additional programs such as quality control/quality assurance program and ISO 9001 in addition to the ISO 9000. These companies realize that they need these programs to stay competitive because they can assist in making continuous improvement of processes and products. TQM can also be used internally to help companies integrate these programs implementation.

ISO 9001 forms will make compliance with ISO 9001 much easier. The best ISO 9001 forms will be save time by requiring only necessary data without duplications; help employees follow procedures without the need to look up separate instructions; increase productivity by combining several ISO 9001 requirements in one efficient form. Many contractors think that they will need to purchase specific ISO 9001 software, for example, for document control, corrective action or for internal ISO 9001 audits. While there are many software solutions available that help with some aspects of ISO 9001, it is not necessary to use any such software.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the type of program used by contractors to improve quality.

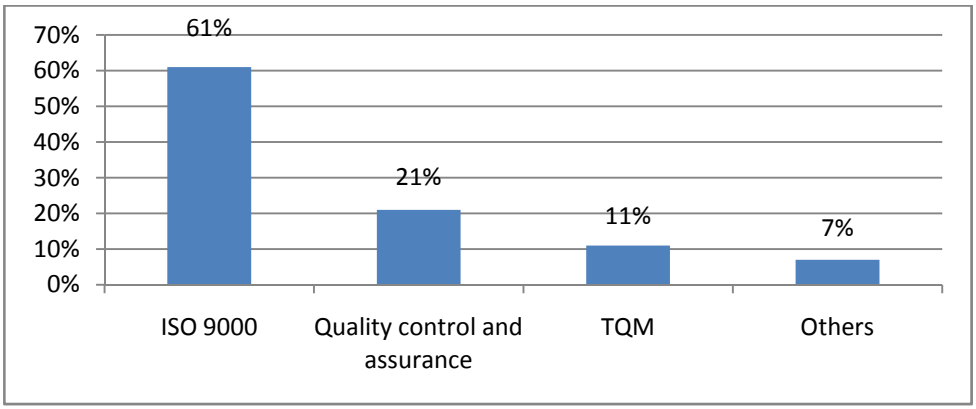



**Figure 4.19** Types of programs used to improve the quality in the construction industry in Semarang.

The figure above shows that the majority of respondents (61%) said that their company uses ISO 9000 for quality improvement program. 21% of them mentioned quality control and quality assurance,11% TQM, while the other 7% said that their company uses others programs as the tool to improve quality.

### 4.8.5 Factors Providing Motivation to Start TQM

Respondents were asked about the motivating factor for the companies to start TQM. Results in general for the respective companies are shown in the table below.

**Table 4.21** Factors providing the motivation to start TQM for the respective contractors

| Companies | Motivating factors |
|---|---|
| Waskita Karya | Pressure from competitors. TQM provides greater competitive value in quality, time and cost |
| Pembangunan Perumahan | The need to reduce costs and improve performance. |
| Wijaya Kusuma | The need to reduce costs and improve performance. |
| Wijaya Karya | Many factors provide the motivation to start TQM |
| Hutama Karya | The need to reduce costs and improve performance. |
| Adhi Karya | The company's chief executive |

The results in general show that the more companies consider the need to reduce costs and improve performance as the most important factor which provides the motivation to start TQM. One contractor see the most important factor is the pressure from competitions, another said that it was the company’s chief executive decision, while the other contractor cited all factors mentioned in the questionnaire as the factors that provide the motivation to start TQM.

TQM requires improvements throughout an organization to reduce waste and rework, lower costs, and increase productivity. It emphasizes on improving profit and quality, hence contractors who are seeking to reduce costs and increase profits choose to implement this program. TQM can guide companies on how to improve profits by

eliminating costs and escalating performance improvement in work results.it also fosters innovation in every field and creates the standard operating procedure for the company.

Contractors that can deliver their project at lower costs than their competitors, while delivering quality products that satisfy their customers will have an advantage over those companies that do not duplicate those feats. The Total Quality Management (TQM) business philosophy of satisfying the customer with quality goods and services, reducing waste and empowering workers and suppliers is a method to achieve those goals.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the company's motivating factor to start TQM.

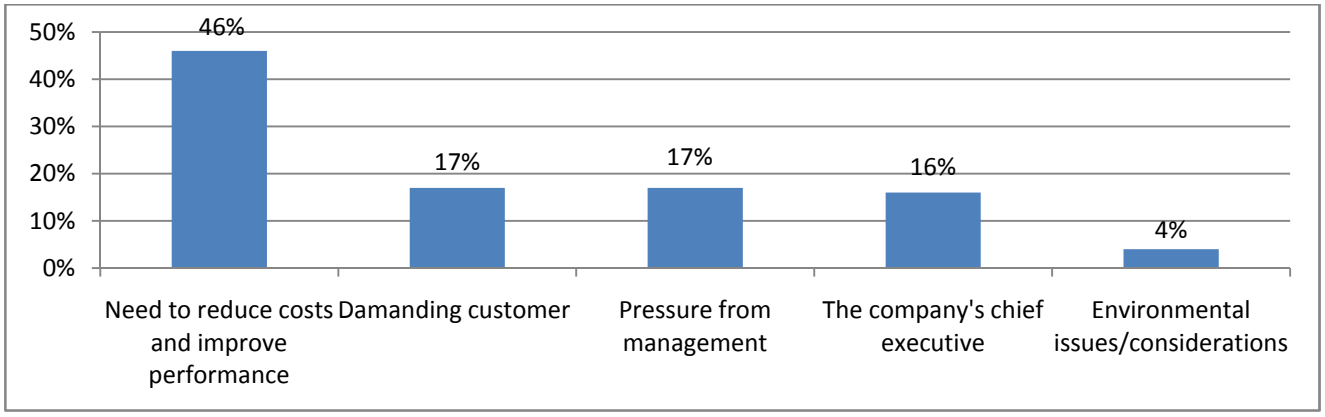



**Figure 4.20** Factors provided the motivation to start TQM in the construction industry in Semarang.

The figure above shows that 46% of respondents said that need to reduce costs and improve performance is the main reason for the company to start the Total Quality Management (TQM). Three other factors (demanding customers, pressure from competitors and the company's chief executive) have almost similar ratio of around 17%, while only 4% of respondents said cited the environment issures and considerations as the main reason for the company to start TQM.

### 4.8.6 The Organization's Quality Improvement Program Description

Respondents were asked to describe their organization's quality improvement program. Results in general for the respective companies are shown in the table below.

**Table 4.22** Organization's quality improvement program description for the respective contractors

| Companies | Quality improvement program description |
|---|---|
| Waskita Karya | A formal program is underway with widespread employee's awareness (developing cross functional management of the organization structure, improving the organization's capital, expanding the company's branches) |
| Pembangunan Perumahan | A formal program is underway with widespread employee's awareness to improve organization quality in company |
| Wijaya Kusuma | A formal program is underway with widespread employee's awareness |
| Wijaya Karya | Unclear. |
| Hutama Karya | A formal program is underway with widespread employee's awareness. |
| Adhi Karya | A formal program is underway with widespread employee's awareness. |

The results in general show that the majority of contractors have a formal quality improvement program already underway with widespread employee's awareness in their organization. One company, however, has failed to provide a clear description of the quality improvement program as its employees gave different descriptions, from a formal program is underway with widespread employee's awareness altogether to there is no formal program yet. Quality improvement program is important because it can develop cross functional management of organization structure, improve the organization capital, and provide help for companies to expand their branches. TQM process will help employees to know how to continouslly improve quality and increase productivity, increase corporate awareness and commitment. Which eventually lead to greater financial benefits for the companies?

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the contractors' quality improvement program description.

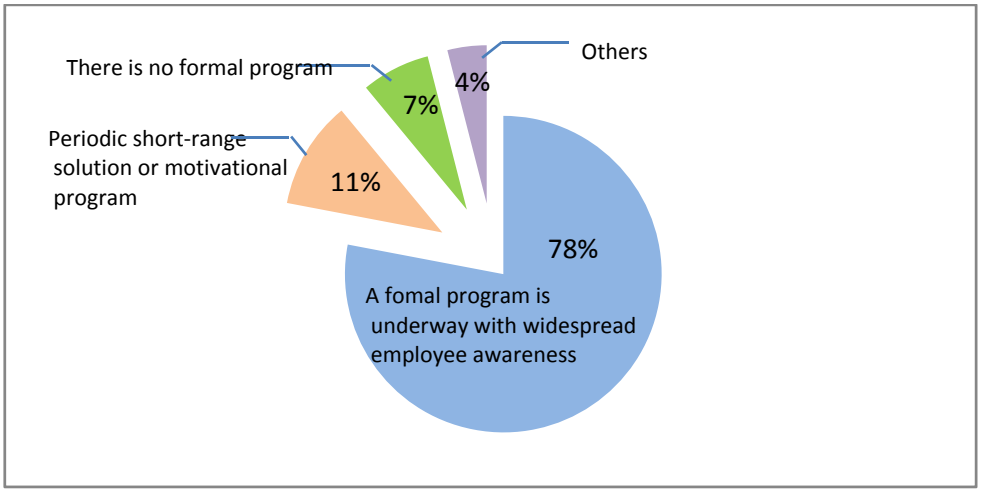



**Figure 4.21** Quality improvement programs description in the construction industry in Semarang.

The majority of respondents (78%) said that in their organization a formal quality improvement program is already underway with widespread employee's awareness. 11% of them said that they have a periodic short-range solution or motivational program in their organization, 7% said that no quality improvement programs present in their organization, while another 4% said that their organization has other programs.

### 4.8.7 Full Support of Top Management for the Quality Improvement Plan

Respondents were asked whether the top management in their organization fully supports the quality improvement program. Results in general for the respective companies are shown in the table below.

**Table 4.23** Top management support for quality improvement plan for the respective contractors

| Companies | Full support of top management on the quality improvement plan |
|---|---|
| Waskita Karya | The quality improvement plan has the full support. |
| Pembangunan Perumahan | The quality improvement plan has the full support. |
| Wijaya Kusuma | The quality improvement plan has the full support. |
| Wijaya Karya | The quality improvement plan has the full support. |
| Hutama Karya | The quality improvement plan has the full support. |
| Adhi Karya | The quality improvement plan has the full support. |

Results in general show that the top management of all contractors fully supports the quality improvement plan. This is important because the support of the top management is essential for successful implementation. Without it every attempt on innovation for quality improvement can not be completed. It is the top management's duty to guide the employees into the right directions so as to promote quality. Quality can refer to the work output by employees as well as the products and services being offered. It also ranges widely to include factors such as training and other types of education that are necessary to ensure the highest standards are upheld. Thus supports from top management are required.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the contractors' top management support for quality improvement plan.

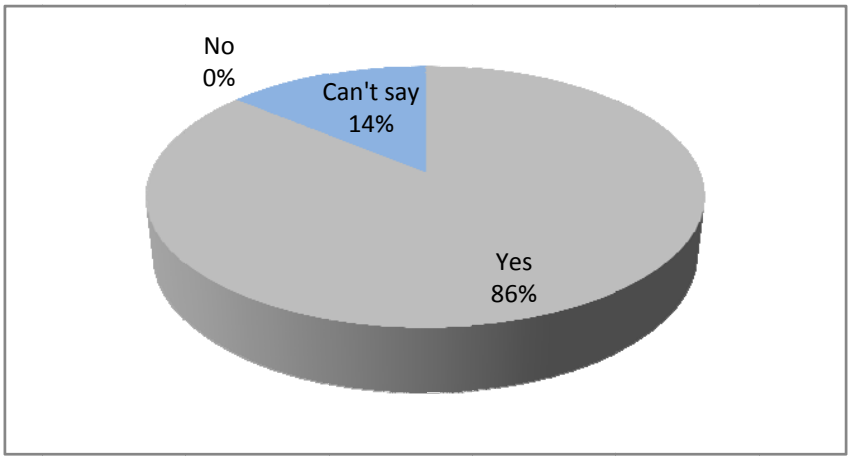



**Figure 4.22** Top management support for quality improvement plan in the construction industry in Semarang.

The figure above shows that the majority of respondents (86%) said that the top management in their organization fully supports the quality improvement plan, while the other 14% could not confirm their top management support for it.

### 4.8.8 The Contractors Major Objectives for Quality Programs

Respondents were asked about the major objective in their organization for their quality programs. Results in general for the respective companies are shown in the table below.

**Table 4.24** The major objectives for quality programs for the respective contractors

| Companies | Major objective |
|---|---|
| Waskita Karya | To increase productivity is the major objectives in determining the quality program. |
| Pembangunan Perumahan | To increase productivity, because it leads to increasing product/service quality, profits and customers satisfaction |
| Wijaya Kusuma | To increase productivity is the major objectives in determining the quality program. |
| Wijaya Karya | To increase productivity is the major objectives in determining the quality program. |
| Hutama Karya | Compliance with statutory, environment and safety requirement is the major objectives in determining the quality program. |
| Adhi Karya | To increase productivity is the major objectives in determining the quality program. |

Results in general show that the majority of contractors' major objective in determining the quality programs is to increase productivity. An Increase in productivity wills eventually lesd to increasing product/services quality, profits and customers satisfation. Although improving the planning quality to get higher efficiency and effectively applying good standard in order to win the competition for their projects are important, any company's most important target to increase productivity is the quality of their employees.

Productivity surveys and case studies indicate that increased worker motivation and satisfaction can increase worker output. Progressive, innovative managers now achieve productivity gains with human resource management techniques that go beyond pay incentives. With better productivity as well as loyal and efficient workers contractors can deliver higher quality work and better results.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the contractors' major objective for quality programs

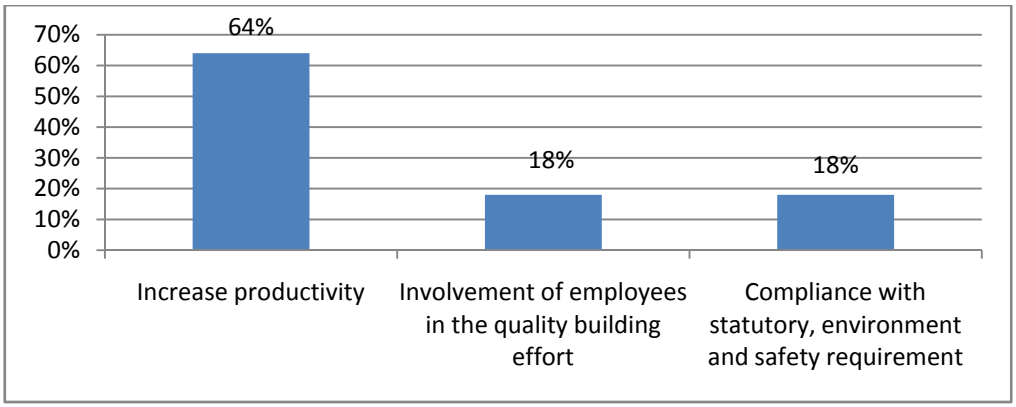



**Figure 4.23** Major objective for quality programs in the construction industry in Semarang.

The majority of respondents (64 %) said that the major objective for quality programs is to increase productivity. It is followed by the employee involvement in the quality building efforts and compliance with statutory, environment and safety requirement with 18% respondents respectively.

### 4.8.9 Steps Taken by Contractors for Quality Improvement Plan

Respondents were asked about the steps taken in their organization for the quality improvement plan. Results in general for the respective companies are shown in the table below.

**Table 4.25** Steps taken for quality improvement plan by the respective contractors

| Companies | The Step taken for the plan |
|---|---|
| Waskita Karya | Organize a multi-disciplinary team. |
| Pembangunan Perumahan | Implementing an educational program. |
| Wijaya Kusuma | Data collection to measure the process. |
| Wijaya Karya | An internal awareness program is underway. |
| Hutama Karya | An internal awareness program is underway. |
| Adhi Karya | Defining benchmarks for improvement. |

Results in general show that different answers were given by contractors to describe the step taken for the quality improvement plan. Two companies said that an internal awareness program is underway in their organization, while one contractor each chose data collection to measure the process, implementing an educational program, defining benchmarks for improvement and organizing a multi-disciplinary team as the step taken for the quality improvement plan.

The tasks of multi-disciplinary team are to recognize problems which put obstacles in development implementation, look for the solution to solve the problems and improve the quality. The benefit of having a multidisciplinary team filled with a diverse range of skills and expertise seems obvious. Yet past research on this issue has been inconsistent, with some studies even suggesting that a team's diversity can have a negative effect. One apparent drawback is that team members with shared backgrounds tend to organize themselves into opposing cliques.

The contractor using data collection to measure the process as their step taken in quality improvement did so because by collecting the data the contractor can improve and develop the quality as well as get the best result from this survey. Other contractors which have an internal awareness program currently underway as their step taken in quality improvement plan view employee' awareness about TQM and its objectives can help them achieve the programs for quality improvement.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the step taken in quality improvement plan.

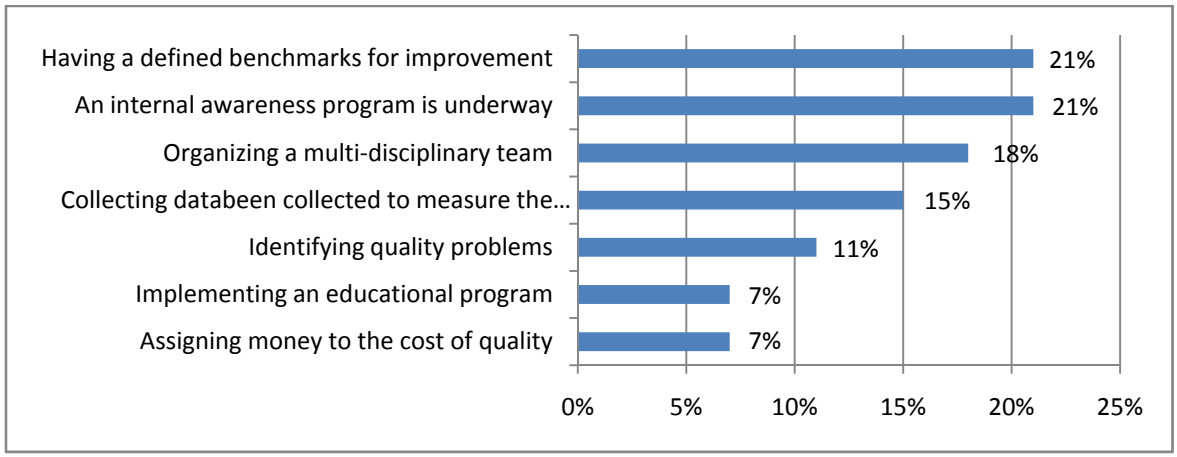



**Figure 4.24** The step taken for quality improvement plan in the construction industry in Semarang.

The figure above shows that that two steps (an internal awareness programs is underway and having a defined benchmarket for improvement) have the same rate of respondents' choice at 21%. They are followed by organizing a multi-disciplinary team, with 18% of respondents and identifying quality problems (11%), while a further 7% respondent respectively said that assigning capital to the cost of quality and implementing an educational program as the steps taken in their organization's quality improvement plan.

### 4.8.10 Quality of Service/Product after the Implementation of Quality Improvement Program

Respondents were asked about the quality of products/service in their organization after the implementation of quality improvement program. Results in general for the respective companies are shown in the table below.

**Table 4.26** The quality of service/product after the implementation of quality improvement program for the respective contractors

| Companies | Quality of product/service after implementation of QIP |
|---|---|
| Waskita Karya | Improved |
| Pembangunan Perumahan | Improved, as employees become more creative on innovation and increase knowledge to improve quality. |
| Wijaya Kusuma | Improved |
| Wijaya Karya | Improved |
| Hutama Karya | Improved |
| Adhi Karya | Improved |

The results in general show that all contractors see improvement in their product/service quality after the implementation of quality improvement program. This implementation enables them to meet their quality goals. Continuous improvement of products quality and process application is seen as the best feature resulted from the implementation of quality improvement program in these companies.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with their product/service quality after the implementation of quality improvement program.

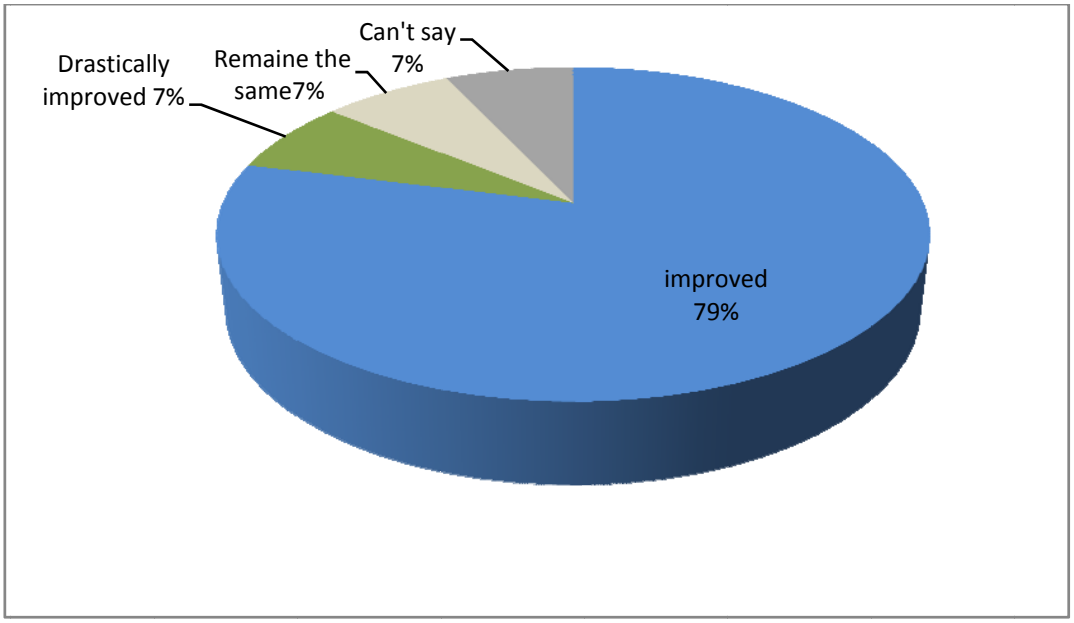



**Figure 4.25** Quality of service/product after the implementation of quality improvement program in the construction industry in Semarang.

The figure above shows that the majority of respondents (79%) said that the quality of service and product has improved that after the implementation of quality improvement program in their respective organization. 7% respondents respectively said that quality has either drastically improved after implementation of quality improvement program, or remain the same, while another 7% cannot say about this program's effect on product/service after implementation.

### 4.8.11 Relationship with Customers and Suppliers after the Implementation of Quality Improvement Program

Respondents were asked about their company's relationship with customers and suppliers after the implementation of quality improvement program in their organization. Results in general for the respective companies are shown in the table below.

**Table 4.27** The relationship with customers and suppliers after the implementation of quality improvement program for the respective contractors.

| Companies | Contractors' relationship with customers and suppliers |
|---|---|
| Waskita Karya | Improved |
| Pembangunan Perumahan | Improved |
| Wijaya Kusuma | Improved |
| Wijaya Karya | Improved |
| Hutama Karya | Improved |
| Adhi Karya | Improved |

The results in general show that all contractors agree that after the implementation of a quality improvement program in their respective organizations, their relationship with customers and suppliers has improved. This improvement is because implementation of quality programs enables the contractor to set a quality standard for their suppliers to meet which has resulted in fewer defects from the suppliers. For the customers improvement in quality has made them satisfied with the results of the contractors' work, hence better relationship is further cemented. TQM is central in providing excellence for customer satisfation through continuous improvements of pr oducts and processes by the involvement and dedication of each individual party in the project.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with contractors' relationship with customers and suppliers after the implementation of quality improvement program.

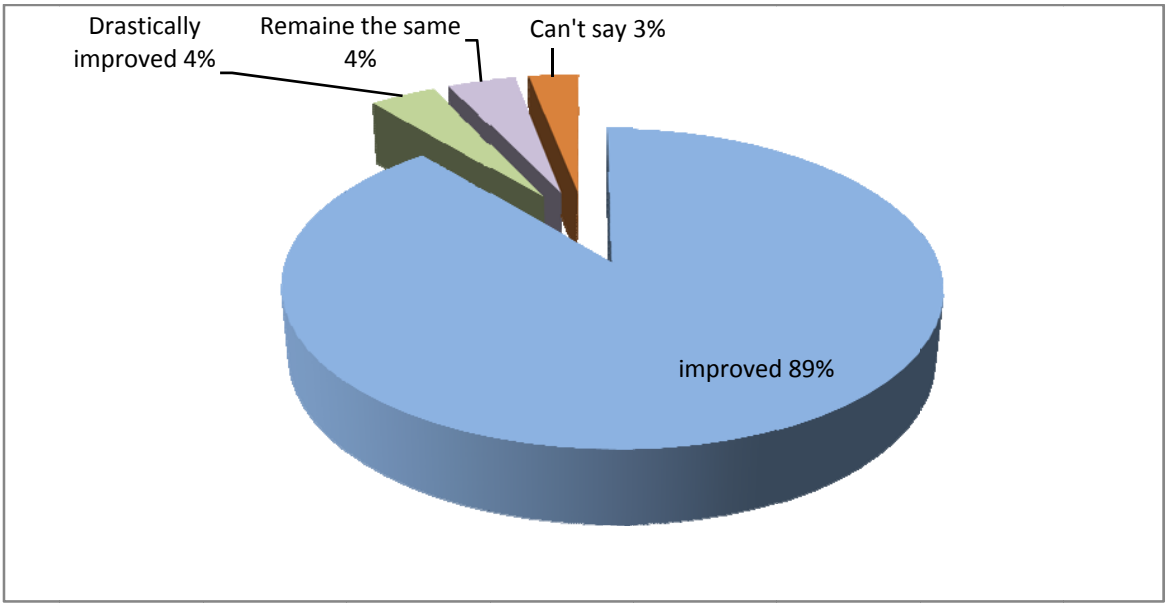



**Figure 4.26** Relationship with customers and suppliers after the implementation of quality improvement program in the construction industry in Semarang.

The figure above shows that the majority of respondents (89%) said that After implementation of quality improvement program, the relationship between their company and its customers and suppliers has improved. 4% respondents respectively said that the relationship has either has drastically improved, or remain the same, while the other 3% cannot say for sure.

## 4.9 Contractors of training TQM

In this section, contractors were asked four questions to find out about the training they provide to their employees in their organizations. Results are as follows.

### 4.9.1 Formal Training in TQM or Other Quality Improvement Philosophies Given to Employees

Respondents were asked whether formal training in TQM or other quality improvement philosophies is given to employees in their organization. Results in general for the respective companies are shown in the table below.

**Table 4.28** Formal training in TQM or other quality improvement philosophies given to employees for the respective contractors

| Companies | Availability of formal training |
|---|---|
| Waskita Karya | Some training is available to employees |
| Pembangunan Perumahan | A formal training program in TQM or other quality improvement philosophies is available to employees |
| Wijaya Kusuma | Some training is available to employees |
| Wijaya Karya | Some training is available to employees |
| Hutama Karya | A formal training program is in effect for the employees |
| Adhi Karya | A formal training program is in effect for employees |

The results in general show that some contractors have a formal training in TQM or other quality improvement philosophies given to their employees, while some others only have some training available. These results show how the contractors, to some degree, want their employee to understand the methods used in the organization to improve quality.

Total Quality Management training is to ensure that employees not only understand the corporate mission, vision, and brand; but also comprehend their individual roles in implementing the mission, vision, and brand of the companies at which they are employed. In order for the whole to succeed, each component must perform at the highest possible potential. Strategic Total Quality Management (TQM), defined as an awareness and maintenance of superior standards in all phases of the organization, requires that each unit of a corporation exerts the same effort toward maintaining high standards which eventually produce a superior product, thereby benefiting the whole.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with whether formal training in TQM or other quality improvement philosophies given to employees

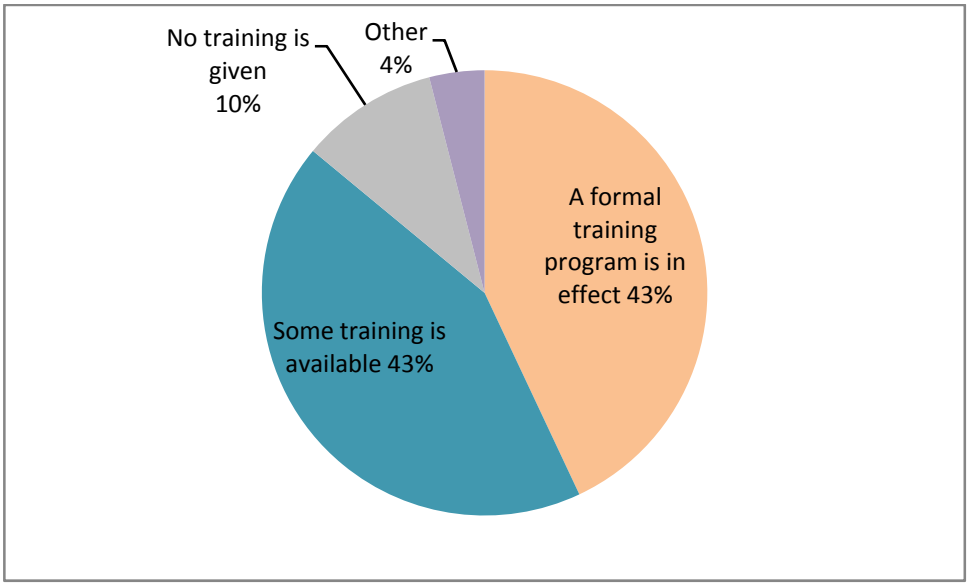



**Figure 4.27** The degree of formal training in TQM or other quality improvement philosophies given to employees in the construction industry in Semarang.

The figure above shows that 43% respondents said that their company provides some to training in the employees, whereas a similar percentage of respondents (43%) said that their company provides a formal training in TQM or other quality improvement philosophy. Another 10% individual respondents said that no training is given to the employees and the rest of them (4%) said that their company provides other training.

### 4.9.2 Percentage of Managerial/Supervisory Staff that has Undergone Quality Improvement Training

Respondents were asked about the percentage of managerial/supervisory staff that has undergone quality improvement training Results in general for the respective contractors are shown in the following figure.

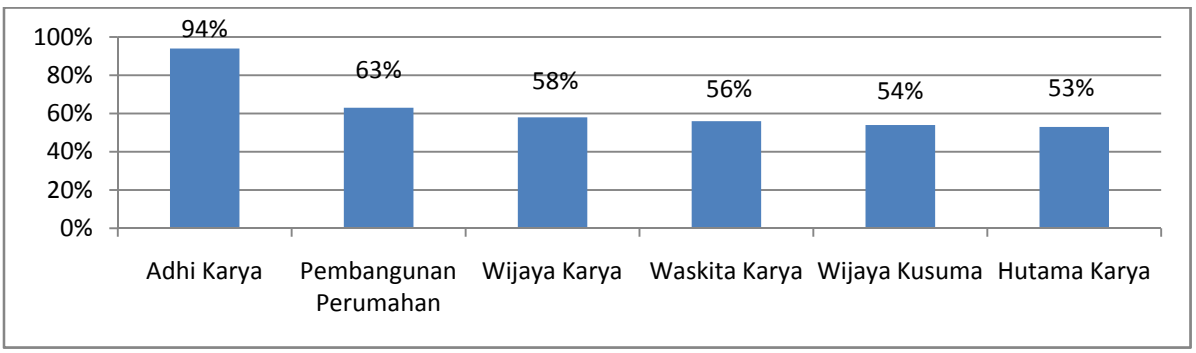



**Figure 4.28** Percentage of managerial/supervisory staff that has undergone quality improvement training in the construction industry in Semarang.

Adhi Karya has the highest percentage at 94%, followed by Pembangunan Perumahan (63%), Wijaya Karya (58%), Waskita Karya (56%), Wijaya Kusuma (54%) and Hutama Karya (53%).

### 4.9.3 Percentage of Non-Managerial/Supervisory Staff that has Undergone Quality Improvement Training

Respondents were asked about the percentage of non-managerial/supervisory staff that has undergone quality improvement training. Results in general for the respective companies are shown in the figure.

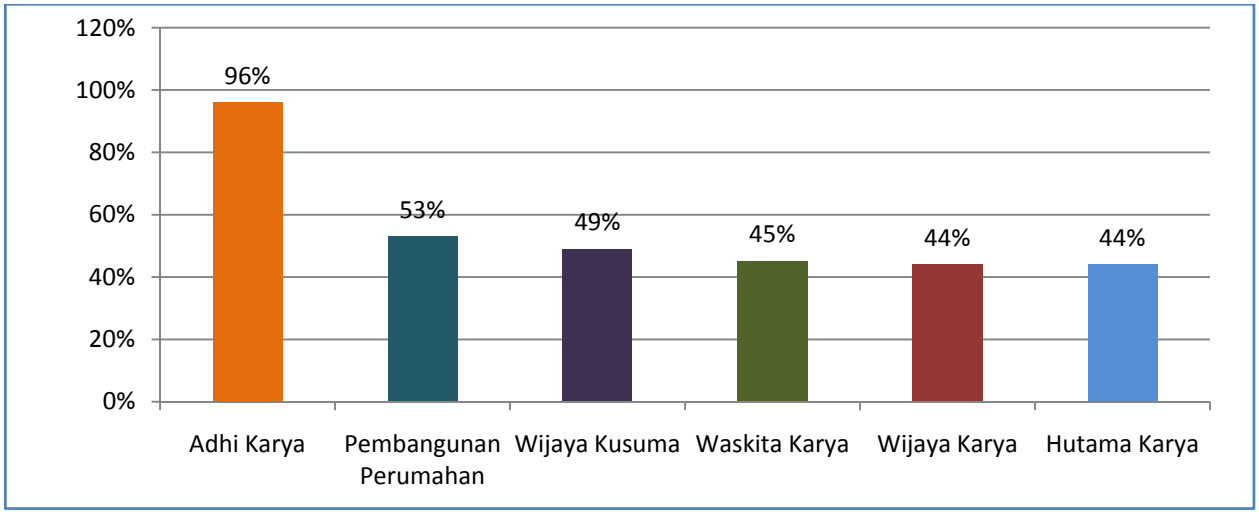



**Figure 4.29** Percentage of non-managerial/supervisory staff that has undergone quality improvement training in the construction industry in Semarang.

Adhi Karya has the highest average rate of non-managerial / supervisory staff that has undergone quality improvement training at 96%. This is far above the second place contractor (Pembangunan Perumahan) at 53%. Wijaya Kusuma is third at 49%, Waskita Karya fourth at 45%, while Wijaya Karya and Hutama Karya are tied at 44%.

### 4.9.4 The Emphasis of Current Training

Respondents were asked about the emphasis of the current training in their company. Results in general for the respective companies are shown in the table below.

**Table 4.29** Emphasis of the current training for the respective contractors

| Companies | Emphasis |
|---|---|
| Waskita Karya | Process control and team work. In project time work and customer satisfaction are important. |
| Pembangunan Perumahan | Process control |
| Wijaya Kusuma | Process control |
| Wijaya Karya | process control |
| Hutama Karya | Not applicable |
| Adhi Karya | Process control |

The results in general show that most contractors emphasize process control in their training. This emphasis is necessary because by having the process control contractors can set the target for suppliers to assure quality. Process control provides contractors with the information so that they can know how to continue productivity improvement process and take input (materials) from suppliers efficiently. Improvement in process leads to better quality products and services as well as less waste and rework. And as always, the better the quality, the higher also customers satisfation.

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the contractors' emphasis of current training.

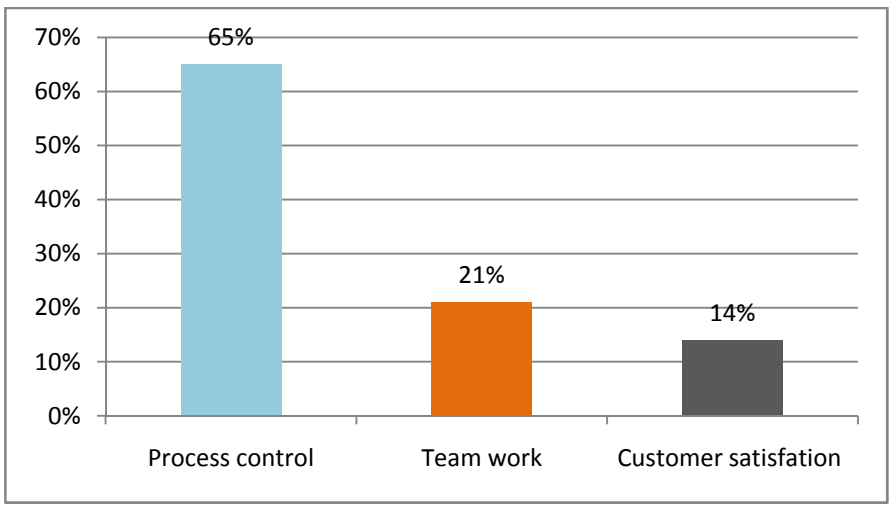



**Figure 4.30** Emphasis of current training in the construction industry in Semarang.

It can be seen from the figure above that most respondents (65%) consider that their company currently emphasizes process control as the training. 21% respondents put team work, while the other 14% see customer satisfaction as the emphasis in their training program.

### 4.10 The Obstacles in Total Quality Management Program Implementation

The following list shows the obstacles in the implementation of Total Quality Management Program. The list is arranged in order of importance based on the data gathered:

1-changing behavior and attitude
2-schedule and cost treated as the main periorities
3-lack of education and training to drive the improvement process
4-lack of top management commitement/understanding
5-lack of employees management commitement/understanding
6-lack of expertIse/resouces in TQM

The following figure highlights the level of response from individual respondents taken part in this research, irrespective of their companies, in relation with the major obstacles of TQM implementation program.

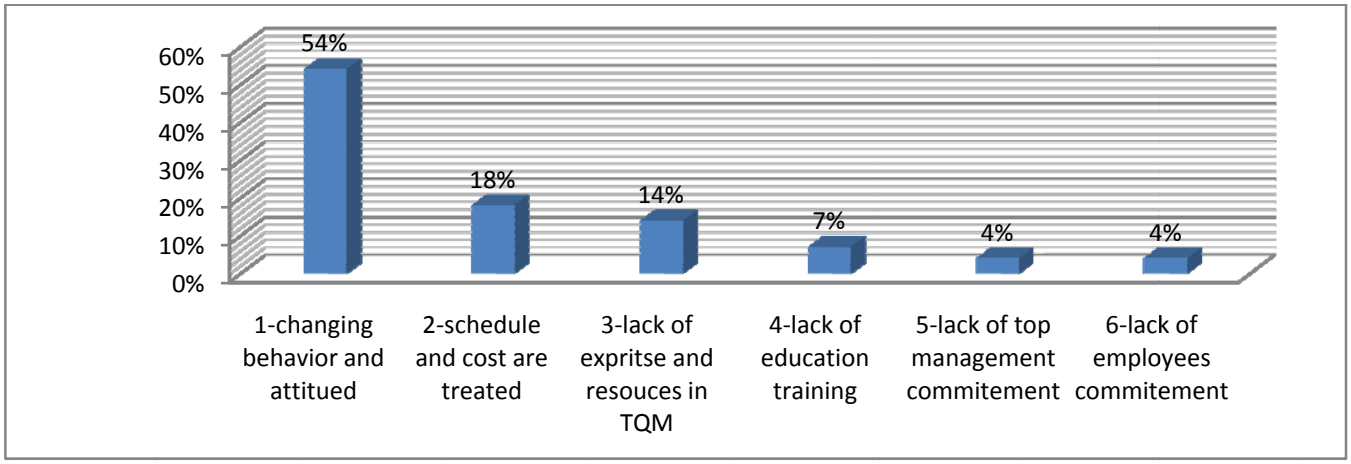



**Figure 4.31** Obstacles in the implementation of TQM program in the construction industry in Semarang.

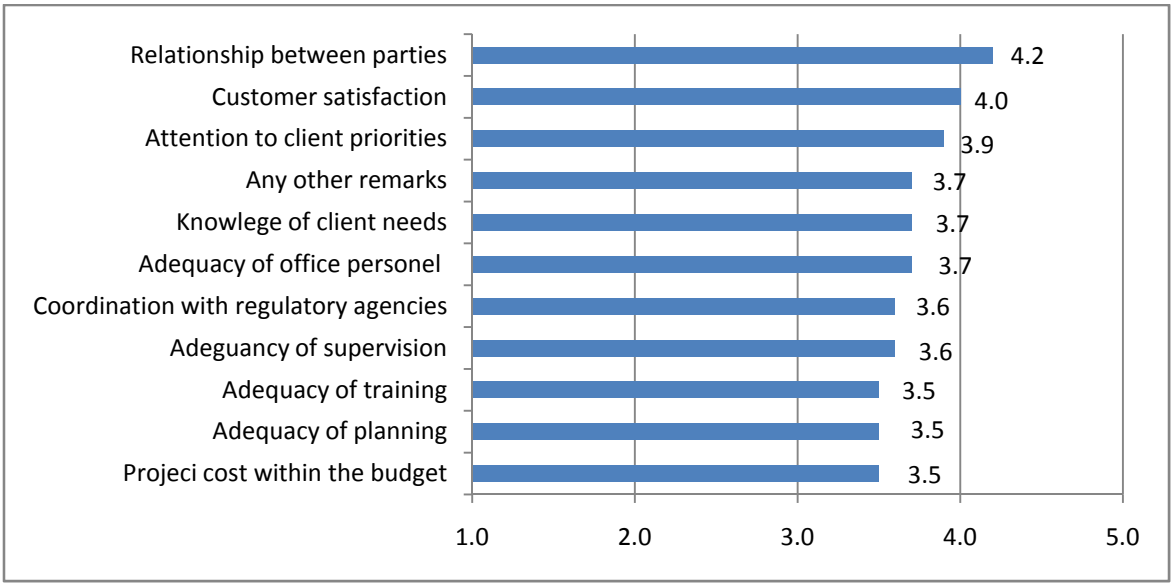
The majority of respondents (54%) said that changing the behavior and attitude of the people in the organization as the biggest obstacle in implementing TQM. 18% respondents chose the fact that schedule and cost are treated as the main priorities in TQM program, 14% the lack of expertise and resouces in TQM, 7% the lack of education and training to drive the improvement process, while 4% each said that the lack of top management commitement/understanding and the lack of employees commitment/undrestanding as the biggest obstacles. People's characters are very difficult to change. Changing people's behavior and attitude means also changing their mentality. When people are comfortable with the situation they are in now, it is very difficult to persuade them to get out of their comfort zone and embrace new things which are still unfamiliar. Implementing TQM also requires focus and discipline from everyone in the organization, which demand extra effort.

### 4.11 Satisfaction Level in Contractors Performance

In this section, respondents were asked to measure the satisfaction rate in the performance of their organization's four processes, namely: administrative, project management and engineering, construction and logistical process. The respondents were the clients of the contractors. They can rate their satisfaction level using five classifications, from strongly dissatisfied to strongly satisfied. Each classification carries a point: the lowest, one, is for strongly dissatisfied, two for dissatisfied, three for neither dissatisfied, four for satisfied and the highest, five, for the strongly satisfied. Results for each company were then combined to get the average collective point representing these six companies for each category of the process. The results are as follows:

### 4.11.1 Satisfaction Level in Administrative Process

Respondents were asked to measure their satisfaction rate of the contractors' administrative process. The average results for each category in this process are shown in the figure below.



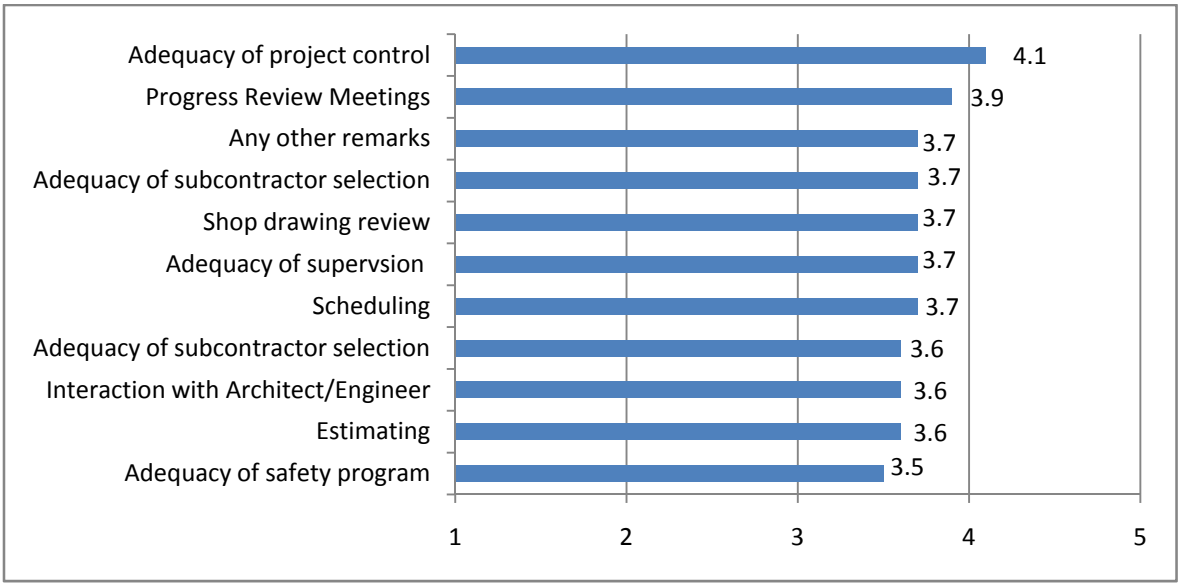

1: strongly dissatisfied, 5: strongly satisfied

**Figure 4.32** Satisfaction level in the contractors administrative process

The results show that in the administrative process, relationship between parties leads the other categories with the highest level of satisfaction (4.2 points), which means that respondents were satisfied with the contractors' performance in this category. This category is also the only one with which respondents were satisfied. The categories least satisfactory in the contractors' administrative process are adequacy of planning, adequacy of training and project cost within the budget with 3.5 points respectively, meaning that respondents were neither satisfied nor dissatisfied with performance in these categories. The average result for these categories is 3.7, also meaning that the respondents were neither satisfied nor dissatisfied with the contractors' administrative process performance.

### 4.11.2 Satisfaction Level in Project Management and Engineering

Respondents were asked to measure their satisfaction rate of the contractors' project management and engineering process. The average results for each category in this process are shown in the figure below.



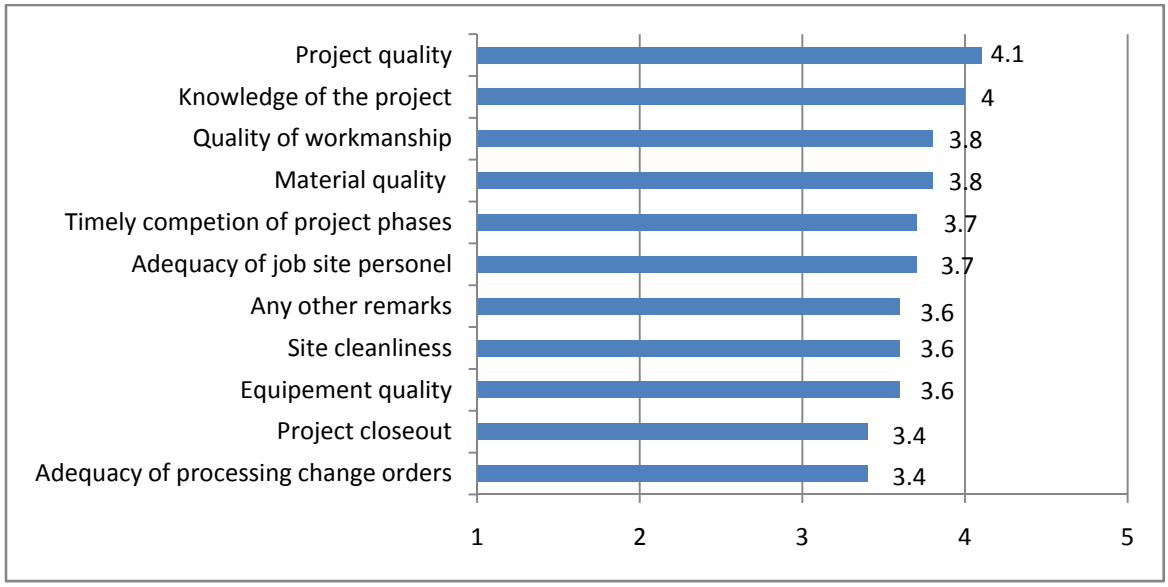

1: strongly dissatisfied, 5: strongly satisfied

**Figure 4.33** Satisfaction level in contractors project management and engineering

The results show that in the contractors' project management and engineering process, adequacy of project control lead the other categories with the highest level of satisfaction (4.1 points). This means that respondents were satisfied with the contractors' performance in this category. This category is also the only one with which respondents were satisfied. The categories least satisfactory in the contractors' project management and engineering process is the adequacy of safety program with 3.5 points, meaning that respondents were neither satisfied nor dissatisfied with performance in this category. The average result for these categories is 3.7, also meaning that the respondents were neither satisfied nor dissatisfied with the contractors' project management and engineering process performance.;

### 4.11.3 Satisfaction Level in Construction Process

Respondents were asked to measure their satisfaction rate of the contractors' construction process. The average results for each category in this process are shown in the figure below.



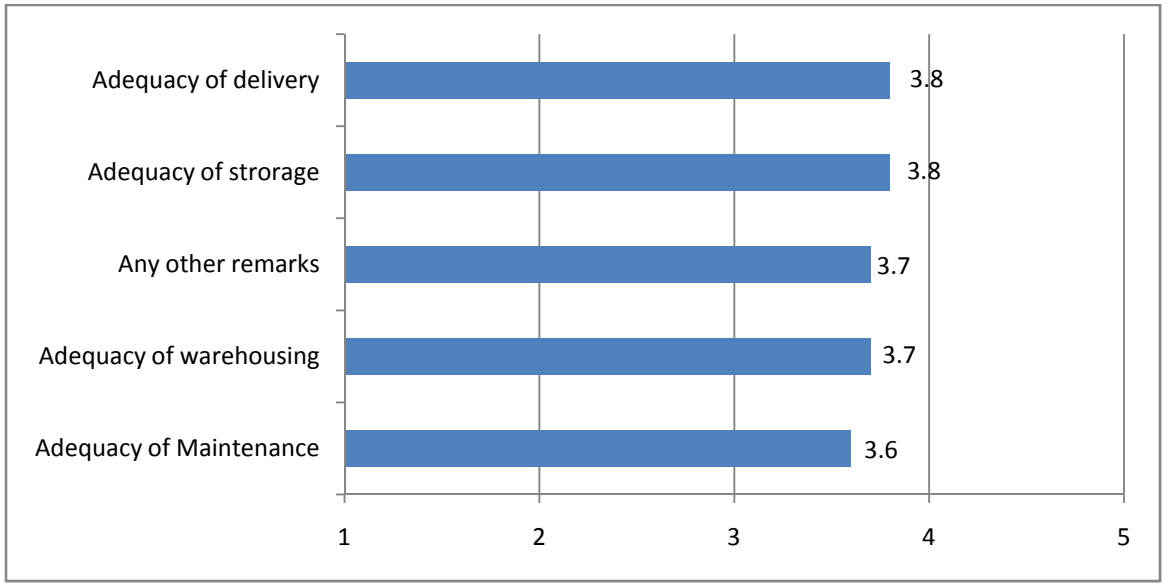

1: strongly dissatisfied, 5: strongly satisfied

**Figure 4.34** Satisfaction level in the contractors construction process

The results show that in the construction process, project quality leads the other categories with the highest level of satisfaction (4.1 points), which means that respondents were satisfied with the contractors' performance in this category. The only other category with which respondents were satisfied is the knowledge of the project. At the bottom of the scale the categories least satisfactory in the contractors' construction process are project close-out and adequacy of processing change order with 3.4 points respectively, meaning that respondents were neither satisfied nor dissatisfied with performance in these categories. The average result for these categories is 3.7, also meaning that the respondents were neither satisfied nor dissatisfied with the contractors' construction process performance.

### 4.11.4 Satisfaction Level in Logistical Process

Respondents were asked to measure their satisfaction rate of the contractors' logistical process. The average results for each category in this process are shown in the figure below.




1: strongly dissatisfied, 5: strongly satisfied

**Figure 4.35** Satisfaction level in the contractors logistical process

The results show that in the contractors' logistical process, adequacy of delivery and storage lead the other categories with the highest level of satisfaction (3.8 points), while the categories least satisfactory is the adequacy of maintenance with 3.6 points, with the average result of 3.7. It should be noted here that respondents were neither satisfied nor dissatisfied with performance of all categories in this process.

# CHAPTER V
# DISCUSSION

## 5.1 Introduction

The first stage of this study identifies the current implementation and adoption of TQM principles in the construction industry through an in-depth questionnaire. The questionnaire was divided into six parts, namely: their knowledge of TQM, their perception of quality, the data acquisition methods used by them, quality in their organization, the degree of training provided to their employees towards TQM, and the obstacles faced by them in implementing TQM in their companies. Below is the discussion for the results.

## 5.2 Contractors Knowledge of TQM

The results show that the contractor with the highest level of knowledge in TQM was Adhi Karya, which already had 94% of its managerial/supervisor staff undergoing quality improvement training. On the other hand, the contractor with the lowest level of knowledge in TQM was Hutama Karya, with only 53% of its managerial/supervisor staff had undergone quality improvement traning.

Three of the six contractors (Wijaya Kusuma, Hutama Karya and Adhi Karya) used customer satisfaction as their measure to define quality. For Waskita Karya and Pembangunan Perumahan their measure to define quality was team work, while for Wijaya Karya the measure was expenses. The majority of contractors thought that if they could increase customers satisfaction, their profits would also increase in the long run. Any contractor needs to fulfill customers's needs by providing the best services and product for them. In the construction industry, giving the best services for the measures means providing good facilities that is satisfactory to the customers, since they are the final users of the facility built by contractors. Also, by focusing on customer satisfaction, the contractors can get a good feedback and further evaluation to make sure that they are providing the quality of service that their customers expect them to provide.

The results sho that the TQM worked very well in three of the contractors (Pembangunan Perumahan, Wijaya Kusuma and Adhi Karya), while in Waskita Karya, Wijaya Karya and Hutama Karya, the TQM only worked to some extent. All of them, however, agreed that the TQM had brought benefit to their respective organizations. The

respondents thought that TQM had done very well in their organization because it helped the contractors increase their productivity and bring benefits for their organization. Some, however, thought that TQM worked only in some particular area i.e., improving the process (the system) that creates products or services to a point that they are error-free and yield minimal scrap or waste of resources. TQM has enabled these contractors improve their quality in their projects. TQM also had other benefits, including the improvement in employees's job satisfaction and productivity as well the increase in profits.

According to the respondents, TQM had been used in their company especially to improve good planning (50% of respondents) and increase market share (35.7%). Also by good planning the contractors can get access to the best organization to supply them with the best products and services to improve operation and increase profits. The majority of respondents were also aware of TQM implementation programs in their organization. all of the respondents from three contractors (Waskita Karya, Wijaya Karya and Wijaya Kusuma) were even aware of the implementation of TQM program. These results show that in general contractors surveyed in this research had good knowledge about the TQM and the potential benefits of its implementation in their respective organization.

### 5.3 Contractors Adoption and Implementation of TQM

The contractors' adoption and implementation of TQM was still low. This can be seen on the fact that only 11% of the respondents mentioned the TQM as the type of program used by the contractors where they worked to improve quality. This low adoption of the TQM program, however, did not mean that the contractors were ignoring the importance of quality improvement program in their respective organizations. The contractors were actually took this program very seriously (89% of respondents even said that a quality improvement program has been a part of the policy in their organization for some time). This was because the contractors were using other type of program. In fact all of the contractors used ISO 9000 in their organization. Two of the contractors (Waskita Karya and Wijaya Karya) used also quality control/quality assurance program. In total, the majority of respondents (61%) said that their companies used ISO 9000 for quality improvement program, 21% of them mentioned quality control and quality assurance, 11% of the respondents mentioned the TQM, while the other 7% said that their companies used others programs.

### 5.3.1 Contractors Perception of TQM

On the contractors' perception of quality, it can be seen from the results that each of the contractors surveyed in this study agreed that quality was a competitive advantage for their respective organizations. The majority of respondents (82%) believed that quality was a competitive advantage for their organization because competitive advantage is the representation of a company's good quality, strength and resistance. Having a competitive advantage can make the company a pioneer and leader in the industry.

Almost all of the contractors believed that the quality of product/service was very important. For one contractor (Waskita Karya), the quality of product/service was only rated as important. Most of the respondents (67%) said that the quality of products/service was very important because they realized that the satisfaction of their customers depend on the quality of the products and services they deliver. If respondents can provide high quality services for its customers, they will trust the company and use its service again in the future.

All of the contractors rated customer satisfaction as very important for their organization. Continuous improvement of service for the customers was always a priority. With high quality services, the contractors hope that their customer satisfaction will ultimately increase also, bringing more potential revenue stream and higher profits for them in the future. Thus the contractors always tried to deliver the best projects with the highest quality possible.

For the process with the potential for improvement in their operation, the respondents considered the testing procedures at job sites as the process with the highest potential for improvement, while the process with the lowest potential was administration of change orders. This was because testing procedure at job sites required technical expertise that is always developing, while the administration procedure was already in a relatively good condition.

Interestingly, however, when the respondents were asked to rank in the order of importance some of the important attributes in their operation, i.e. quality, safety within their construction sites, time, cost and scope, they ranked scope and quality as the most important considerations, followed by cost, safety within their construction sites and time (schedule). To have a complete scope of project was very important because the clients always demanded their project to have all the facilities as specified in the design.

Four of the contractors (Waskita Karya, Pembangunan Perumahan, Hutama Karya and Adhi Karya) used the leading company in their field as their quality level benchmark for their company. According to most of the respondents (64%), the contractors used the leading company in the field as their benchmark because the contractors saw that the leading company had become successful in their business due to the fact that it had high quality standard. Thus the majority of contractors wanted to emulate this success by setting their quality goals accordingly.

### 5.3.2 The Contractors Data Acquisition Method

The results for this section show that five of the contractors surveyed in this study (Pembangunan Perumahan, Wijaya Kusuma, Wijaya Karya, Hutama Karya and Adhi Karya) collected data to measure operational performance. For Waskita Karya, the company sometimes collected data, while at other time not. In total, the majority of all of the respondents taken part in this study (75%) mentioned that their company collected data to measure operational performance. They considered collecting data as the best method to measure their operation performance and the quality of their works. By collecting data it was hoped that the contractors could quickly recognize the problems they were facing, and thus continuously maintained or even improvde quality.

On how their respective organization solves problems, three of the contractors (Waskita Karya, Pembangunan Perumahan, Hutama Karya) set up a multi-disciplinary team for each problem in the organization, while the other three contractors (Wijaya Kusuma, Wijaya Karya, Adhi Karya) even had a permanent team available in their organization to solve the problem. On the whole, 50% of respondents said that the contractors set up a multi-disciplinary team for each problem, 39.3% said that a permanent team was available and only 10.7% said that their company assigned individual to solve problems. The important thing is that the companies need to have a team which coordinate and manage all problems arising in their work that can have negative impact on the progress of the project.

On gathering customer suggestions, all contractors had such system for gathering customer suggestion in their organization, as stated by most of the respondents (78%).. Information from their customers was necessary to improve process and obtain customer satisfaction. Four contractors (Waskita Karya, Wijaya Kusuma, Wijaya Karya and Adhi Karya used questionnaire surveys to measure customer satisfaction. Hutama Karya

measured their customer satisfaction by the number of complaints, while Pembangunan Perumahan used other methos such as dealing directly with complains from customers, input from owners about the operation and informal meeting. For the construction industry in Semarang as a whole, the method used most often was by questionnaire and by the number of complaints. 50% of the respondents said that their company measured customer satisfation through questionnaire surveys, while 32% of them said that their company gathered customer suggestion by the number of complaints. Measuring customer satisfaction using questionnaire surveys can give the customers the chance to give many advices and measure the company's performance.

In two of the contractors (Pembangunan Perumahan, Hutama Karya) employees were fully empowered to make significant changes in operations, while in the other four contractors (Waskita Karya, Wijaya Kusuma, Wijaya Karya, Adhi Karya) only key personnel were emowered to make significant changes in operations. For the construction industry in Semarang as a whole, the majority of respondents (54%) said that their company only empowered key personnel in the organization to make significant changes in operations because the company believed those people were the ones with the ability, skill and creativity to make significant changes. 35% respondents said that their company empowered all personnel to make significant changes in the organization. The idea is that everyone can contribute provided they are given the right education and training. Another 4% said that employee empowerment to make any significant changes operation in their organization was not needed.

The results also show that all contractors rated their suppliers/subcontractors. The respondents said that the contractors required their suppliers/subcontractors to be rated as the companies wanted the best suppliers and subcontractors in order to get the best service and product. For the construction industry in Semarang as a whole, 53% of respondents said that most supplieries/subcontractors in their company were rated. Another 43% of them said that their company rated all supplieries/subcontractors in their company, while 4% cannot say.The companies need to be professional and up to the standard level. The three things usually considered from suppliers and subcontractors were the capital, human resouces and experience. The respondents also said that the quality of employee, health records and costs of their suppliers/subcontractors as the other criteria that need to be considered from suppliers/subcontractors.

Moreover, if defect in services were identified, all contractors agreed that the subcontractors must be held responsible for those defects and required to pay for or correct them. For the construction industry in Semarang as a whole, the majority of respondents (82%) said that the subcontractors had to pay for or correct defect of their service when they were identified, 11% of them said the subcontractors were not requred to pay for or correct them, while 7% cannot say. It is the responsibility of each subcontractor to correct defect and mistake in their work. In this sence, the subcontractors need to be very careful to avoid mistake and shortcomings in their work and to provide the best service possible. By doing this this both the contractors and subcontractors are benefitted.

### 5.3.3 Quality in the Contractors Organization

All of the contractors have also developed a clear definition of quality in their respective organization. For the construction industry in Semarang as a whole, 89% of respondents surveyed saw a clear definition of quality in their respective organizations. Developing a clear definition of quality is necessary because the contractors need their employees to understand that the quality of the buildings that they build is very important for the company, as it affects customer satisfation. It is hoped that by having a clear definition of quality the companies can maintain or even improve their quality further with innovation so that they can be trusted by the potential customers.

On the employee awareness of the importance of quality, the results obtained from the respondent's show that of the six companies surveyed in this research, five had average employee awareness rates above 70%, with only the employees in Wijaya Karya had awareness level below 70%. Awareness can be obtained through exercises and training. This lack of awareness of the importance of quality can results in the failure of the company in meeting its customer's demand. Employees training can improve skills or add the existing level of knowledge so that they are better equipped to do their present job or become more prepared for higher position with increase responsibilities. The highest percentage of employees who were aware of the importance of quality was found at Adhi Karya (89%), while the lowest was at Wijaya Karya (56%).

On the existence of quality improvement program in the company, the results show that a quality improvement plan has been part of corporate policy for some time in all of the six contractors surveyed in this study. For the construction industry in Semarang as a whole, 89% of respondents said that a quality improvement program has been a part of the

policy in their organization for some time now, 7% of them said that such a plan was under consideration, while another 4% of respondents said that a quality improvement program has only been recently implemented in their organization. Sharing and updating knowledge among employees to know better method were encouraged by some contractors as it was considered that this program would help the organization in maintaining and even improving good quality management.

On the type of program used by the contractors to improve quality, the results show that all contractors used ISO 9000 program. For the construction industry in Semarang as a whole, the majority of respondents (61%) said that their companies used ISO 9000 for quality improvement program. 21% of them mentioned quality control and quality assurance, 11% mentioned TQM, while another 7% said that their companies used others programs. The companies needed these programs to stay competitive. The ISO 9000 could assist them in making continuous improvement of processes and products, while TQM was used internally to help companies integrate these programs implementation.

The contractors had different motivations in starting TQM program in their company. In Waskita Karya the motivations were pressure from competitors and because TQM provided greater competitive value in quality, time and cost. In Pembangunan Perumahan, Hutama Karya and Wijaya Kusuma, the motivations were to reduce costs and improve performance. In Adhi Karya the the motivation came from the chief executive, while in Wijaya Karya there were many factors such as pressure from competitors, demanding customers, environmental issues and the need to reduce coss and improve performance. For the construction industry in Semarang as a whole, 46% of respondents considered the needs to reduce costs and improve performance as the motivations to start TQM in their organizations. They saw that improvements throughout the organization to reduce waste and rework and lower costs as key factors to increase productivity. Three other motivating factors (demanding customers, pressure from competitors and the company's chief executive) had almost similar ratio of around 17%, while the environment issues were cited by only 4% of respondents.

On how to describe the quality improvement program in their company, five of the contractors said that their company had a formal program underway with employee awareness in their organization, while in Wijaya Karya the description was unclear. For the construction industry in Semarang as a whole, the majority of respondents (78%) said that their company had a formal program underway with employee awareness in their

organization. 11% said that their company had a periodical short-range solution or motivational program, 7% said that there was no such program and the other 4% of respondents said that their organization had other programs. Quality improvement program is important because it can develop cross functional management of organization structure, improve quality and increase productivity, increase corporate awareness and commiment. TQM put emphasize on improving profits and quality, hence contractors seeking to reduce costs and increase profits choose to implement this program.

Results in general show that the top management of all contractors fully supported the quality improvement. For the construction industry in Semarang as a whole, the majority of respondents (86%) said the contractors' top management gave full support for QIP in the organization, while another 14% could not confirm whether their top management's support for it. This result is important because the support of the top management is essential for successful implementation of the program. Without it every attempt on innovation for quality improvement can not be completed because it is the top management's duty to guide the employees into the right direction to promote quality.

For the contractors' major objectives for quality improvement program, five of the contractors mentioned that their objective was to increase productivity. For one other contractor (Hutama Karya), the major objective was to comply with statutory, environment and safety regquirement. For the construction industry in Semarang as a whole, the majority of respondents (64%) said that the major objective for quality program was to increase productivity, followed by the employee involvement in the quality building efforts and compliance with statutory, environment and safety requirement, with 18% of respondents respectively. An increase in productivity will eventually lead to increasing product/service quality, profits and customer satisfaction; although improving the planning quality to get higher efficiency and effectively applying good standard in order to win competition for their projects are also important.

The contractors had different answers for the steps taken by them for quality improvement plan. In Waskita Karya the step taken was to organize a multi-disciplinary team; in Pembangunan Perumahan: to implement an educational program; in Wijaya Kusuma: data collection to measure the process,;in Adhi Karya: to define benchmark for improvement; while in Wijaya Karya and Hutama Karya said thet an internal awareness program was underway. For the construction industry in Semarang as a whole, the results obtained from the respondents show that two steps (an internal awareness programs is

underway and having a defined benchmark for improvement) had the same rate of respondents' choice at 21%. They were followed by setting up a multidisciplinary team, assigning capital to the cost of quality and implementing an educational programs as the steps taken in their organization's quality improvement plan. The contractors also used data collection to measure the process. By collection data the contractors can improve and develop the quality as well as get the best result from this survey.

All contractors said that their quality of product/service had improved after the implementation of quality improvement program. For the construction industry in Semarang as a whole, most of the respondents (79%) saw improvement in their company's product/service quality after the implementation of quality improvement program. This improvement was because after the implementation of such program in their organization, the employees had become more creative on innovation and their knowledge on how to improve quality increased.

All contractors also agreed that their relationship with customers and suppliers had also improved after the implementation of quality improvement program. For the construction industry in Semarang as a whole, 89% of the respondents also felt that their relationship with customers and suppliers had also improved after implementing quality improvement program. This was because the implementation of the program enabled the contractor to set a quality standard for their suppliers to meet, in order to get fewer defects from the suppliers, and thus fewer complains.

### 5.3.4 Contractors TQM Training

On the formal training in TQM or other quality improvement philosophies given to the employees, three contractors (Pembangunan Perumahan, Hutama Karya, Adhi Karya) had a formal training program available to their employees. The other three contractors (Waskita Karya, Wijaya Kusuma, Wijaya Karya), however, only had some training available to their employees. For the construction industry in Semarang as a whole, 43% of respondents said that their company provided a formal training in TQM or other quality improvement philosophy, while a similar percentage of respondents, on the other hand, said that their company provided only some training to employees. 10% said no training was given, while the other 4% of them said that their company provided other training. TQM training ensures that employees not only understand the corporate mission, vision,

and brand; but also comprehend their individual roles in implementing these mission, vision and brand of the companies at which they are employed.

The results show that Adhi Karya had the highest average rate of managerial/supervisory staff that has undergone quality improvement training (94%), while the contractors with the lowest rate was Hutama karya at 53% only. On average 63% of managerial/supervisory staff in the contractors surveyed has been given training on quality management philosophy. For non managerial/technical staff, the highest percentage of personnel that have undergone quality improvement training was found at Adhi Karya (96%), while the average number for the six contractors was 55%.

For contractors (Pembangunan Perumahan, Wijaya Kusuma, Wijaya Karya, Adhi Karya) mentioned process control as their emphasis of current training. In Waskita Karya the emphasis were process control and team work, while the answer from Hutama Karya was not applicable. For the construction industry in Semarang as a whole, it can be seen from the results that most respondents (65%) considered that their company emphasized process control in the training. 21% of them said that team work was the emphasis, while 14% of them see customer satisfaction as the emphasis in their training program. This emphasis in process control is necessary because by having excellent process control, contractors can set the target for suppliers to meet. Process control provides contractors with information so that they can continue productivity improvement process and take in materials from suppliers efficiently. Improvement in process leads to better quality, which means also higher customers satisfaction.

### 5.3.5 The Obstacles in Total Quality Management Program Implementation

The following listing gives a breakdown of the obstacles in total quality management program implementation in the contractors' organizations from the most important obstacle to the least important one:

1-changing behavior and attitude

2-schedule and cost treated as the main periorities

3-lack of education and training to drive the improvement process

4-lack of top management commitement/understanding

5-lack of employees management commitement/understanding

6-lack of expertIse/resouces in TQM

Continuous improvement of TQM is important. It is easy to infer from the above that although 'Total Quality Management' has been a magic word in the construction Industry for the past few years, methods and techniques to implement the Quality Management program in the Industry are still to be developed. The basic problem attributed to a lack of expertise or resources for implementing quality improvement programs is the difficulty in assessing what to measure and how to measure them – particularly the intangible aspects of quality. Without measurement, the notion of continuous improvement is hard to follow.

The majority of respondents 54% said that changing behavior and attitude of the people in organization as the biggest obstacle in implementating TQM, while only 4% of respondents respectively mentioned the lack of top management commitement/understanding and lack of employees commitment/understanding as the biggest obstacles. People's characters are very difficult to change. Changing people's behavior and attitude means also changing their mentality. When people are comfortable with the situation they are in now, it is very difficult to persuade them to get out of their comfort zone and embrace new things which are still unfamiliar. Implementing TQM also requires focus and discipline from everyone in the organization, which demand extra effort.

### 5.4 Satisfaction Level in Contractors Performance

The second phase of the research studied respondents satisfaction level in contractors' performance. The respondents (the contractors' clients) were asked to indicate a measure of their satisfaction level of the contractors' four processes, namely: administrative, project management and engineering, construction and logistical process.

The results for the administrative process show that respondents were satisfied with the contractors' relationship between parties. This category is also the only one with which respondents were satisfied. The average result for the categories in the administrative process was 3.7, meaning that in general the respondents were neither satisfied nor dissatisfied with the contractors' administrative process performance.

The results for the contractors' project management and engineering process show that respondents were satisfied with the contractors' performance in adequacy of project control. The average result for the whole categories was 3.7, also meaning that in general

the respondents were neither satisfied nor dissatisfied with the contractors' project management and engineering process performance.

The results for the construction process show that respondents were satisfied with the contractors' performance in project quality. The average result for the whole categories in this process was 3.7, meaning that in general the respondents were neither satisfied nor dissatisfied with the contractors' construction process performance.

The results for the contractors' logistical process show that no category in this process is satisfactory to the respondents. The average result for the whole categories in this process was 3.7, again meaning that the respondents were neither satisfied nor dissatisfied with performance of all categories in this process.

# CHAPTER VI
# CONCLUSIONS AND RECOMMENDATIONS

## 6.1 Conclusions

Several conclusions can be drawn from the final results analysis obtained from the respondents' responses in this study.

### 6.1.1 The Knowledge of TQM among Contractors in Semarang

On the investigation of the knowledge of TQM among contractors in Semarang, the results show that the contractor with the highest level of knowledge in TQM was Adhi Karya, which already had 94% of its managerial/supervisor staff undergoing quality improvement training. On the other hand, the contractor with the lowest level of knowledge in TQM was Hutama Karya, with only 53% of its managerial/supervisor staff had undergone quality improvement traning. Most of the respondents measured quality based on customer satisfaction. They also viewed that TQM was either worked very well in their organization or worked only to some extent. They all agreed that TQM program has brought benefit to their respective organizations. According to the respondents, TQM had been used in their company especially to improve good planning (50% of respondents) and increase market share (35.7%). On the awareness of TQM implementation, the respondents had a view that most of the staff in the company was aware of such program.

### 6.1.2 The Contractors Adoption and Implementation of TQM

Almost all of the contractors believed that the quality of product/service was very important. The majority of respondents (82%) believed that quality was a competitive advantage for their organization. Most of the respondents (67%) also said that the quality of products/service was very important because they realized that the satisfaction of their customers depend on the quality of the products and services they deliver. Most of the respondents rated customer satisfaction as very important. Continuous improvement of service for the customers was always a priority. The respondents also considered the testing procedures at job sites as the process with the potential for improvement in their operation. Interestingly, however, when the respondents were asked to rank in the order of importance some of the important attributes in their operation, they ranked scope and quality as the most important considerations, followed by cost and safety within their

construction sites. Time (schedule), however, was at the bottom place. According to most of the respondents (64%), the contractors used the leading company in the field as their benchmark in quality.

Five of the contractors surveyed in this study collected data to measure operational performance. For the construction industry in Semarang as a whole, the majority of the respondents (75%) said that their company collected data to measure operational performance. They considered collecting data as the best method to measure their operation performance and the quality of their works. On how their respective organization solves problems, 50% of respondents said that the contractors set up a multi-disciplinary team for each problem. Most of the respondents (78%) said that their company had a system for gathering customer suggestions in the organization. According to the respondents, the method used most often was by questionnaire (50%). The majority of respondents (54%) said that their company only empowered key personnel in the organization to make significant changes in operations because the company believed that those people were the ones with the ability, skill and creativity to make significant changes. 53% of respondents said that most supplieries/subcontractors in their company were rated. Moreover, the majority of respondents (82%) said that the subcontractors had to pay for or correct defect of their service when they were identified.

The results show that all contractors used ISO 9000 program. For the construction industry in Semarang as a whole, the majority of respondents (61%) said that their companies used ISO 9000 for quality improvement program. 21% of them mentioned quality control and quality assurance, 11% mentioned TQM, while another 7% said that their companies used others programs. The contractors have also developed a clear definition of quality in their respective organization. 89% of respondents surveyed saw a clear definition of quality in their respective organizations. On the employee awareness of the importance of quality, five of the six companies surveyed had average employee awareness rates above 70%. The highest percentage of employees who were aware of the importance of quality was found at Adhi Karya (89%), while the lowest was at Wijaya Karya (56%). 89% of respondents said that a quality improvement program has been a part of the policy in their organization for some time now. 46% of respondents considered the needs to reduce costs and improve performance as the motivations to start TQM in their organizations. On quality improvement program, the majority of respondents (78%) said that their company had a formal program underway with employee awareness in their

organization. The majority of respondents (86%) said the contractors' top management gave full support for QIP in the organization. The majority of respondents (64%) also said that the major objective for quality program was to increase productivity. On the steps taken in their organization's quality improvement plan, two steps (an internal awareness programs is underway and having a defined benchmark for improvement) were chosen by 21% of respondents respectively. The majority of respondents (79%) felt that the quality of their products and services had improved after implementing quality improvement program, while 89% of them also felt that their relationship with customers and suppliers had also improved after implementing such program.

On the formal training in TQM or other quality improvement philosophies given to the employees, three contractors (Pembangunan Perumahan, Hutama Karya, Adhi Karya) had a formal training program available to their employees. The other three contractors (Waskita Karya, Wijaya Kusuma, Wijaya Karya), however, only had some training available to their employees. Fo the construction industry in Semarang as a whole, 43% of respondents said that their company provided a formal training in TQM, while a similar percentage of respondents, on the other hand, said that their company provided only some training to employees. Adhi Karya had the highest average rate of managerial/supervisory staff that have undergone quality improvement training (94%), while the contractors with the lowest rate was Hutama karya at 53% only. On average 63% of managerial/supervisory staff in the contractors surveyed has been given training on quality improvement. For non managerial/technical staff, the highest percentage of personnel that have undergone quality improvement training was found at Adhi Karya (96%), while the average number for the six contractors was 55%. Most respondents (65%) considered that their company currently emphasized process control in the training. The majority of respondents (54%) said that changing behavior and attitude of the people in organization was the biggest obstacle in implementating TQM.

### 6.2 Recommendations

Contractors should continue to increase their employees' knowledge of TQM in their respective organizations so that they can always have a standard in operations to keep the customer satisfied. In implementing TQM the contractors should also put more emphasis in team work within their organization because by having a good team work communication, both internally within the organization and externally with the customers

and suppliers, can be done more openly and smoothly; thus increasing productivity. To insure excellent TQM implementation, contractors should also give TQM training for all their employees instead of only some.

Below are some of the recommendations that can be implemented in the future by the contractors:

1-The contractors with the lowest rate of knowledge about the TQM (Hutama Karya, Wijaya Karya, Waskita Karya and Wijaya Kusuma) shold have their supervisor/managerial staff undergo quality improvement training.

2-Provide the tools, techniques and training in the companies for analyzing, understanding, and solving quality problems.

3- Emphasize team work for continuous improvement quality and improve participation of all employees to make this program successful.

4- Strive on changing the staff's culture so that they can understand the benefits they can have in applying TQM in the organization.

5- Increase top management's commitement and employees' understanding of TQM by giving them education to drive the improvement process.

6- The contractors must put more emphasis not only on their process control but also on team work and customer satisfaction, as both of them are also important for successful application of TQM in their companies.

7 Future research on this topic must obtain data from the right source by taking into consideration the position and years of experience of each respondent.

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## Appendix A

Company Information.

Name of the company: _____

Nature of company (prime contractor/sub-contractor/consultant/supplier/vendor):

_____

Size of the company (no. of persons): _____ (admin) _____ (technical)

Age of the company: _____

Ongoing/completed projects in Semarang:

_____

_____

_____

Would you like to be contacted again regarding this questionnaire, if your answer is Years, please write down your name and contact details:

_____

_____

**Knowledge of TQM**

**Description of TQM :** Total Quality Management (TQM) is a comprehensive and structured approach to organizational management that seeks to improve the quality of products and services through ongoing refinements in response to continuous feedback. TQM requirements may be defined separately for a particular organization or may be in adherence to established standards, such as the International Organization for Standardization's ISO 9000 series. TQM can be applied to any type of organization; it originated in the manufacturing sector and has since been adapted for use in almost every type of organization imaginable, including schools, highway maintenance, hotel management, and churches. As a current focus of e-business, TQM is based on quality management from the customer's point of view.

**1. Which one of these words best define quality?(chose one of them only)**

☐ Expensive

☐ Satisfying customer (outside the organization)

☐ Appearance

☐ Increased profit

☐ Value for money

☐ Teamwork

**2. Do you think that TQM will (or does) work in your organization?**

☐ Very well

☐ To some extent

☐ Won't work

☐ Can't say

**3. Would a TQM program be beneficial to your organization?**

☐ Yes

☐ No

☐ Can't say

**4. TQM would be used to improve:**

☐ Good planning

☐ Cost estimating

☐ Warranty claims

☐ Reduce change order

☐ Reduced lawsuits

**5. Are you aware of any industry programs to implement TQM or of the ISO 9000 standards?**

_____

_____

**Perception of Quality**

**6. What is your organization's perception of quality?**

☐ Elimination of defects

☐ A tool to increase profits

☐ A competitive advantage

☐ Others (.....)

**7. How would you rate the importance of product/service quality:**

☐ Very important

☐ Important

☐ Somewhat important

☐ Can't say

**8. How would you rate customer satisfactio**n?

☐ Very important

☐ Important

☐ Somewhat important

☐ Not important

☐ Can't say

**9. Please rate the potential for improvement within the following processes:**

| | Very low | Low | Netural | High | Very high |
|---|---|---|---|---|---|
| ☐ On-site supervision | | | | | |
| ☐ Redesign | | | | | |
| ☐ Testing procedures at job sites | | | | | |
| ☐ Certification of material | | | | | |
| ☐ Administration of change orders | | | | | |
| ☐ Close-out of projects | | | | | |
| ☐ On-site safety | | | | | |
| ☐ Personnel management on site office | | | | | |
| ☐ Coordination with other members of a project | | | | | |

**10. Please rank in order of importance (1, 2, 3, 4, 5):**

☐ Cost : ____

☐ Scope : ____

☐ Time (Schedule) :____

☐ Quality : ____

☐ Safety : ____

11**. Do you set your quality goals to the level of:**

☐ The leading company in your field

☐ The competition in general

☐ To a level set internally

☐ Other (.....)

**Data Acquisition Method**

**12. Do you collect data to measure the performance of operations?**

☐ Yes

☐ No

☐ Can't say

**13. How does your organization solve problems?**

☐ Assign individual to solve

☐ Set up a multi-disciplinary team for each problem

☐ A permanent team is available

☐ Other (.....)

**14. Do you have a system for gathering customer suggestion?**

☐ Yes

☐ No

☐ Can’t say

**15. How do you measure customer satisfaction?**

☐ Not measured

☐ Questionnaire surveys

☐By the number of complaints

☐ Other methods (.....)

**16. Are employees empowered to make significant changes to operations?**

☐ Fully empowered

☐ Only key personnel are empowered

☐ Empowerment is not needed

☐ Can’t say

**17. Are suppliers/subcontractors rated?**

☐ All

☐ Most

☐ None

☐ Can’t say

**18. Defects in services are identified and subcontractors are required to pay for or correct them:**

☐ Yes

☐ No

☐ Can’t say

**Quality in your Organization**

**19. Has your organization developed a clear definition of quality?**

☐ Yes

☐ No

☐ Can't say

**20. Percentage of employees who are aware of the importance of quality > 50% or < 50% ?**

_____%

**21. Does your organization have a quality improvement program?**

☐ No (Please go to next section of question)

☐ Such a plan is under consideration

☐ A quality improvement program has been implemented recently

☐ A quality improvement plan has been a part of corporate policy for some time now

**22. What type of quality improvement program do you have?**

☐ Total Quality Management

☐ ISO 9000

☐ Quality Control / Quality Assurance

☐ Others (.....)

**23. Which of the following factors provided the motivation to start TQM**

☐ Pressure from competitors

☐ Demanding customers

☐ Your company's Chief Executive

☐ Environmental issues/considerations

☐ Need to reduce costs and improve performance

**24. Your organization's quality improvement program can be described as:**

☐ There is no formal program

☐ Periodic short-range solutions or motivational program

☐ A formal program is underway with widespread employee awareness

☐ Others (.....)

**25. Does your quality improvement plan have the full support of top management?**

☐ Yes

☐ No

☐ Can't say

**26. The major objectives of your quality programs are:**

☐ Increase productivity

☐ Cost reduction

☐ Involvement of employees in the quality building effort

☐ Compliance with statutory, environment and safety requirement

☐ Others (please specify)

**27. Steps taken in your quality improvement plan include:**

☐ Organized a multi-disciplinary team

☐ Data has been collected to measure the process

☐ A dollar value has been assigned to the cost of quality

☐ (Cost of quality = cost of conformance + cost of non-conformance)

☐ An internal awareness program is underway

☐ An educational program has been implemented

☐ Quality problems have been identified

☐ Have defined benchmarks for improvement

**28. After the implementation of your quality improvement program, service/product quality has:**

☐ Drastically improved

☐ Improved

☐ Remained the same

☐ Decreased

☐ Can't say

☐ Not applicable

**29. After the implementation of your quality improvement program, relationship with your customers and suppliers has:**

☐ Drastically improved

☐ Improved

☐ Remained the same

☐ Decreased

☐ Can't say

☐ Not applicable

**Training**

**30. Is formal training in TQM or other quality improvement philosophies given to employees?**

☐ No training is given (please skip the rest of question)

☐ Some training is available

☐ A formal training program is in effect

☐ Other (please specify)

**31. Percentage of managerial/supervisory staff who have undergone quality improvement training"**

_____%

**32. Percentage of non-managerial/technical staff who have undergone quality improvement training**"

_____%

**33. Training currently emphasizes:**

☐ Process control

☐ Statistical analysis

☐ Data gathering & analysis

☐ Team work

☐ Communication

☐ Customer satisfaction

**Others**

**34. Obstacles in the implementation of TQM program**

☐ Changing behavior and attitude

☐ Schedule and cost treated as the main priorities

☐ Emphasis on short-term objects

☐ Lack of education and training to drive the improvement process

☐ Too much documents are required (Lack of documentation ability)

☐ Lack of top-management commitment/understanding

☐ Lack of employee's commitment/understanding

☐ Tendency to cure symptom rather than get to the root cause of a problem

☐ Lack of expertise/resources in TQM

☐ Current tendering/bidding climate

## Appendix B

Questionnaire 2

**Please mark just one appropriate box**

| **1. Administrative** | | | | | |
|---|---|---|---|---|---|
| | Strongly Dissatisfied | Dissatisfied | Neither Satisfied nor Dissatisfied | Satisfied | Strongly Satisfied |
| 1) Relationship between parties | | | | | |
| 2) Adequacy of office personnel | | | | | |
| 3) Project Cost within the Budget<br>4) Knowledge of client needs | | | | | |
| 5) Attention to client priorities<br>6) Adequacy of supervision | | | | | |
| 7) Coordination with regulatory agencies<br>8) Adequacy of planning | | | | | |
| 9) Adequacy of Training | | | | | |
| 10) Customer Satisfaction | | | | | |
| Any other remarks | | | | | |

| **2. Project Management and Engineering** | | | | | |
|---|---|---|---|---|---|
| | Strongly Dissatisfied | Dissatisfied | Neither Satisfied nor Dissatisfied | Satisfied | Strongly Satisfied |
| 1) Progress Review Meetings<br>2) Adequacy of Project Control | | | | | |
| 3) Adequacy of Safety Program<br>4) Estimating | | | | | |
| 5) Scheduling | | | | | |
| 6)Interaction With Architect/Engineer | | | | | |
| 7) Adequacy of supervision | | | | | |
| 8) Shop drawing review<br>9) Adequacy of planning | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 10) Adequacy of subcontractor selection | | | | | |
| Any other remarks | | | | | |

**Please mark just one appropriate box**

| **3. Construction** | | | | | |
|---|---|---|---|---|---|
| | Strongly Dissatisfied | Dissatisfied | Neither Satisfied nor Dissatisfied | Satisfied | Strongly Satisfied |
| 1) Project Quality<br>2) Adequacy of job site personal | | | | | |
| 3) Material Quality<br>4) Quality of workmanship | | | | | |
| 5) Equipment Quality | | | | | |
| 6) Timely completion of project phases | | | | | |
| 7) Knowledge of the project | | | | | |
| 8) Site cleanliness<br>9) Adequacy of processing change orders | | | | | |
| 10) Project closeout | | | | | |
| Any other remarks | | | | | |

| **4. Logistical** | | | | | |
|---|---|---|---|---|---|
| | Strongly Dissatisfied | Dissatisfied | Neither Satisfied nor Dissatisfied | Satisfied | Strongly Satisfied |
| 1) Adequacy of Storage | | | | | |
| 2) Adequacy of Warehousing | | | | | |
| 3) Adequacy of Delivery<br>4) Adequacy of Maintenance | | | | | |
| Any other remarks | | | | | |